



Department of Public Works

SEWER STANDARDS

February 2021

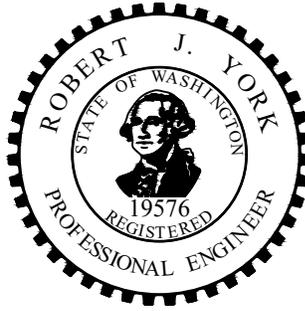
CERTIFICATION

The City of Issaquah Sewer Standards, February 2021, was prepared under the direction and supervision of the following registered professional engineer:



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Public Works Director



SEWER STANDARDS

February 2021

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1. DEFINITIONS

Acceptance of Improvement	Adoption of a resolution by the City of Issaquah City Council, accepting the improvements into City maintenance or written acceptance by the City of Issaquah City Engineer where authorized by City Council. Acceptance of a private development project requires written acceptance by the City Engineer.
City	City of Issaquah, a municipal corporation, or the Director of Public Works and his/her authorized representatives.
City Engineer	Director or Interim Director of Public Works or City of Issaquah Engineer having authorities specified in State Law or City Ordinances or his/her designated representatives.
Contractor	The person, partnership, firm, or corporation contracting to do the work under these Documents. The term shall also include the Contractor's agents, employees, and subcontractors.
Developer	The owner and/or other owners of property to be benefited by the proposed extension, including the Developer's agents. Any person, firm, partnership, association, joint venture, or corporation of any other entity responsible for a given project.
Development	The uses to which the land that is the subject of a discretionary action by the City of Issaquah shall be placed, the buildings to be constructed and all alterations of the land and construction incident thereof.
Engineer	The Consulting Engineer or City Engineer and the Engineer's Staff.
Improvements	Public and private land; grading, street work, curbs, gutters, driveway, storm drain facilities, water mains, sanitary sewers and facilities, public utilities including existing overhead utilities required to be converted to underground, landscaping, and fences to be installed on land to be used for public right of way, private streets and easements, and any other improvements as defined by City of Issaquah Municipal Code
Plans	All drawings, lists, notes, and instructions including reproductions thereof, for the work to be done as an extension to the City system, prepared or approved by the City Engineers.
Professional-Engineer of Work/Record	Professionals in the technical fields of Civil Engineering, Electrical Engineering, Geotechnical Engineering, Engineering Geology, Landscape Architecture, Structural Engineering and Surveying currently licensed or registered in the State of Washington and qualified by both experience and educational background in the specific technical areas as warranted by the specific needs of the proposed development project.
Public Works Director	Director or Interim Director of Public Works or his/her designated representative.

Otherwise Specified or As Specified	The directions contained in the Plans, Special Provisions, if any, and otherwise as given by the City incident to the performance of the work other than in these General Specifications.
Work	The labor, materials, superintendence, equipment, transportation, supplies and other facilities necessary to convenient to the completion of the proposed extension described in the application.

2. PREFACE

The City of Issaquah, as a municipal corporation, has a responsibility to the public to ensure utilities laid on public or private streets or easements are constructed in accordance with currently accepted standards. The requirements imposed upon Contractors or Developers by these standards are not arbitrary but are intended by the City as incorporating minimum standards which are prerequisite to acceptance of the work by the City as a part of the utility systems. Privately constructed extensions of and connections to public utilities or other publicly owned and operated systems will not be permitted unless the work is performed in accordance with these standards.

This document provides standard guidance for design and construction of utilities within the City of Issaquah. These Standards are founded from City policy, Codes, and standards of industry practice for design and construction.

The City of Issaquah Comprehensive Plan and utility (Water, Sewer, or Stormwater) System Plan provides policy guidance for the utility network regarding the provisions of level of service. City policies and standards provide a consistent framework for the planning, design, construction, maintenance, operation, and service for the City's utilities and infrastructure. The City manages its utilities and infrastructure in accordance with established federal and state regulations.

These Standards include all items in the Table of Contents, including the Preface, Definitions, Standards/Requirements, Design, Construction and Appendix sections. These Standards do not include design of special facilities, such as sewer lift stations. These special facilities require unique design requirements and will be subject to individual review by the City.

3. STANDARDS / REQUIREMENTS

A. Applicability

These Standards shall govern all new construction and upgrading facilities that connect to or become part of the City's system, both in the right-of-way and on private property, even if not owned or maintained by the City. Although these Standards are intended to apply to physical development for City infrastructure, the Standards may not be applicable for every situation encountered during engineering design. Compliance with these Standards does not relieve the designer of the responsibility to apply conservative and sound professional judgment. These are minimum Standards and are intended to assist, but not substitute for competent work by design professionals. As such, the City may at its sole discretion due to special conditions and/or environmental constraints or other situations that may require the application of professional engineering judgement require more stringent requirements than would normally be required under these Standards.

B. Document Coordination and Amendments

Except where these Standards provide otherwise, all engineering, design and construction shall be in accordance with:

- American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets.
- American National Standards Institute, Inc. (ANSI)
- American Public Works Association (APWA)
- American Society for Testing and Materials (ASTM)
- Washington Administrative Code (WAC)
- King County Surface Water Design Manual (KCSWM)
- Washington State Department of Health (DOH)
- Department of Ecology (DOE)
- American Water Works Association (AWWA)
- Washington State Department of Transportation (WSDOT) Standard Specifications for Road, Bridge, and Municipal Construction
- Manual of Uniform Traffic Control Devices (MUTCD)
- City of Issaquah's Municipal Code (IMC)
- City of Issaquah's Comprehensive Plan
- City of Issaquah's Sewer System Plan.

When reference is made to any specifications, it shall be the latest revision at the time of construction, except as noted on the plans or herein.

C. Developer Responsibility

At no cost to the City, the developer is responsible for design, preparation of plans, submittal of permit applications, payment of City fees, dedication of right-of-way and easements, construction, surveying, material testing, construction supervision of all infrastructure improvements and compliance with City code. All improvements shall be designed per current City Standards and approved by the City Engineer prior to issuance of any permits for construction. All applications for permits and/or other approvals by the City shall be submitted to the Permit Center for processing.

D. Deviation from Standards

The City Engineer or designee may approve deviations to the Standards herein after consultation and consensus with affected City departments. The decision to grant, deny or modify the proposed deviation shall be documented and be based upon evidence that the request can meet the following criteria:

1. The deviation will achieve the intended result in equivalent or superior design; and
2. The deviation addresses public safety and operation; and
3. The deviation will not adversely affect how well the surrounding nearby public facilities can be maintained; and
4. The deviation will not substantially increase maintenance and/or operation and/or capital replacement costs relative to that which these Standards normally would result in and
5. The deviation is consistent with the land use goals/visions for the area.

Applicants submitting plans for required approvals or permits that do not meet all Standards must note the proposed deviation from these Standard(s) on the face of drawings and describe the deviation(s) on the appropriate plan sheet(s). The request for deviation should be submitted via a letter with attachments to describe the deviation and how it meets the above criteria. Permits issued based on drawings does not assume approval of any deviations that have not been shown. Deviations from the standards that are not shown on the drawings and a permit is issued based upon those drawings constitutes grounds for revocation of permit(s) and/or withdrawal of any approvals and/or stoppage of any or all of the permitted work. Upon review of the plans, the City may request additional information regarding the request if needed to make a decision. These requests may include but are not limited to engineering calculations, drawings showing aesthetic appearances, additional information on nearby facilities, further analyses regarding public safety and operations of the utility(s), and an explanation of why such a deviation is being requested.

A deviation request for a proposed project cannot be considered until a complete application for a required permit/approval has been submitted.

Any appeal of the decision to grant or deny a deviation shall be reviewed by the Public Works Director.

E. Errors and Omissions

At the discretion of the City Engineer, any significant errors or omissions in the approved plans or information used as a basis for such approvals will constitute grounds for withdrawal of any approvals and/or stoppage of any or all of the permitted work. It shall be the responsibility of the Developer to show cause why such work should continue and make such changes in plans that may be required by the City before the plans are re-approved.

F. Drawing Standards

Sewer designs shall be on separate plan sheets, although alignments of all utilities shall be shown on each utility plan. The City may request profile drawings to show relationship to other underground utilities and/or where the City utility crosses railroad tracks, streets, rivers, and drainage ditches and/or any other places where it would clarify construction. Plan sets may be combined for small projects if improvements are clear and legible (contact City engineer for guidance). Designs for water and sewer can be combined on the same plan sheets if plan scale is 1"=10', 1"=20', or 1"=30'. The drawing should be easy to read, with all lines and letters providing clarity between existing and new construction. Architectural scales for utility drawings will not be accepted.

All plan sheets shall have a plot size of 36" x 24" (D size), including title block in PDF format. Project name and site address shall be included in the title block. When more than one sheet is required to cover all the construction area, an overall drawing will be required. Preliminary plans shall be in PDF format. On plans with more than one sheet, stationing shall proceed from left to right or from bottom to top.

The plan drawing shall clearly show the relationship of the proposed utility to other existing and proposed underground utilities as well as its relationship to street paving, curb, gutters, and sidewalks. All utility appurtenances (i.e.: valves, fire hydrants, fittings/bends, manholes, catch basins, streetlights, traffic control devices, etc.) shall be called out and fully located by stationing along centerline of street, or base line of easements, etc.

North Arrow shall be included on all plan view drawings. Where possible, the north arrow shall face up and/or to the right-hand side of the plan sheet.

Datum shall show both horizontal (NAD-83/91) and vertical (NAVD 88) control points.

Drafting Standards/Symbols shall conform to Washington State APWA Chapter CAD Standards. Layering shall comply with City requirements (see Appendix A). Lettering shall be done with "Leroy-style" font (AutoCAD "simplex" font).

Upon approval for construction, final plan shall be provided in both hard copy and digital format for record drawings and permanent record. The digital format shall include PDF and AutoCAD ".dwg" file, latest version, submitted electronically. Electronic file shall include all plans, profiles, notes, and details.

Shop Drawings, shall have a plot size of 36" x 24" (D size) in PDF format, and may be at any scale which will adequately show the detail necessary for fabrication or construction of the piping, equipment, machinery, etc.

Record Drawing (As-Built) shall be submitted by contractor and shall meet all the requirements of the Plan Drawing. Final approved record drawings shall also be submitted in mylar form. Utilities outside of public right-of-way shall be located within easements. Easements and recording numbers shall be shown on the record drawings. See Appendix A for more Record Drawing requirements.

G. Permits

In accordance with the City of Issaquah Municipal Code, permits are required to be obtained from the City of Issaquah prior to commencing construction work within the City. Contact the Community Planning and Development Department for a list of City required permits, approvals, and environmental reviews associated with the requested construction. Permits from other agencies may also be required based on the work being proposed and are the responsibility of the developer to obtain prior to commencing work.

All applications for permits to be issued by the City shall be submitted to the Permit Center for processing.

Specifications, construction drawings, and other required information shall be submitted when approvals or permits are being requested for a project. Construction drawings shall show as a minimum: plan and profile for all existing and proposed improvements, applicable analyses, and

reports, proposed and existing utilities; and topography. The drawings shall also include right-of-way or easements, improvement alignments, detail drawings of connection points or special features, temporary erosion and sedimentation control, construction disturbance area, tree protection, and critical areas and any other pertinent information necessary for construction. The construction methods and materials for all improvements shall conform to the City Design Standards and all other standard plans and specifications of the City or otherwise adopted by the City. To obtain a complete list of specific submittal requirements please contact the Permit Center.

All drawings, plans, specifications, technical reports, etc., prepared for the purpose of obtaining required permits/approvals shall be stamped and signed by the Professional Engineer registered in the State of Washington responsible for the design

At the discretion of the City Engineer, any significant (as deemed by the City) errors or omissions in the approved plans or information used as a basis for such approvals constitute grounds for revocation of permit(s) and/or withdrawal of any approvals and/or stoppage of any or all of the permitted work. It shall be the responsibility of the Developer to show why such work should continue. In order to continue work the Developer must make necessary changes to the approved plans for approval by the City as required to address the issues.

Prior to receiving a Final Certificate of Occupancy and/or acceptance of the work by the City, the applicant shall submit City approved record drawings for all installed improvements.

H. Inspection and Tests

All work may be subject to inspection by the City except for work around and with water mains which require full time inspection and must be coordinated in advance of the work to ensure staff availability. The City shall at all times have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection. The Contractor shall make reasonable tests of the work at the Contractor's expense upon the City's request. Whenever work must be specially tested or inspected for compliance with public regulations, or with the Plans and Specifications, the Contractor shall give the City reasonable notice of the readiness of the work for such test or inspection. The City shall attempt to make inspections within one (1) business day of notification by the Contractor. Use My Building Permit to schedule inspections a minimum of 24 hours (1 business day) ahead of when the inspection is needed. Work must not be covered up without consent of the City, and if it should be covered without such consent, it must be uncovered for inspection at the Contractor's expense if request by the City.

Inspections shall be performed as follows:

1. Work performed within the public right-of-way or on private property as described in the Standards, whether by or for a private developer, by City forces, or by a City contractor, shall be done to the satisfaction of the City and in accordance with the Standard Specifications, any approved plans, and the Standards. Unless otherwise authorized, the City must approve any revisions to construction plans in writing before being implemented.
2. The City shall have authority to enforce the Standards, as well as other referenced or pertinent specifications. The City will appoint project engineers, assistants, and inspectors as necessary to inspect the work and they will exercise such authority to ensure the project is constructed in accordance with the standards, standard practices, and good workmanship.

3. It is the responsibility of the Developer, Contractor, or their agents to have an approved set of plans, along with any applicable permits on the job site whenever work is being accomplished.
4. After permit issuance and the pre-construction meeting (if required), it is the responsibility of the Developer, Contractor, or their agents to notify the City at least 5 days in advance of the commencement of any authorized work. A preconstruction conference and/or field review shall be required before the commencement of any work on a significant project, or as determined by the City.

Testing shall be performed as follows:

1. Refer to WSDOT Standard Specs, Section 7-17.3(2)E, and/or F whichever applies
2. Method of testing gravity sewers shall be a water or air test at the option of the Contractor and a CCTV inspection.
3. The acceptance test and CCTV inspection shall be made after backfilling has been completed and compacted, but prior to the final lift of HMA.

Water Test:

Tests for water tightness shall be made by the Contractor in the presence of the Engineer. A test shall be made every section of the sewer, including the side sewers, after completion of backfill. Where the groundwater table is so high as to preclude a proper exfiltration test, an infiltration test may be used. The exfiltration test shall be made by plugging the inlets of the lower manhole and filling the test section with water to a height of six (6) feet above the crown of the sewer at the upper end of the sewer being tested.

In no case shall the static level be less than six (6) feet above the water table at the upper end of the sewer being tested when using an exfiltration test. Where the static pressure on the lower manhole would exceed 20 feet, the Contractor may test the sewer between manholes in two or more sections. The Contractor may provide for sectional testing by installing tees in the main line. The tees shall be a type that permits plugging of both the upper and lower run of the tee. The required static water head may be obtained by installing vertical lengths of pipe in the tee or from the upper end of the sewer pipe being tested at shallow manholes.

The Contractor shall provide a groundwater observation well at each manhole for determining the level of the groundwater during the test. The observation well shall consist of one-inch plastic pipe installed vertically adjacent to the manhole. The lower end of the test well shall be placed in a one (1) cubic yard pocket of washed gravel and shall be at the same elevation as the invert of the manhole. The upper end of the test well shall be a maximum of two (2) feet below the finished grade elevation and shall be plugged and exposed until completion of the test.

The time of exfiltration tests shall be a minimum of one (1) hour. The leakage during the test shall not exceed the following allowances:

Allowable Leakage – Exfiltration or Infiltration

Allowable Leakage in gal\100 linear feet\hr. Head above Crown on Lower End of Test Section.

Pipe	6 Ft.	8 Ft.	10 Ft.	12 Ft.	14 Ft.	16 Ft.
6	0.6	0.7	0.7	0.8	0.8	0.9
8	0.8	0.9	1.0	1.0	1.1	1.2
10	1.0	1.1	1.2	1.3	1.4	1.5
12	1.2	1.3	1.4	1.6	1.7	1.8
15	1.5	1.7	1.8	2.0	2.1	2.3
18	1.8	2.0	2.2	2.3	2.5	2.7
24	2.4	2.6	2.9	3.1	3.4	3.6

Repair by chemical grouting will not be allowed.

For static head above the basic eight feet at the crown of the sewer at the lower end of the test section, the allowable leakage shown above shall be increased at a ratio of 5 percent per foot increase.

Where the groundwater exceeds a height of six feet above the crown of the sewer at the upper end of the test section, the section shall be tested by infiltration. The infiltration test shall be conducted by placing a plug in the inlet sewer at the upper manhole and inserting an approved measuring device in the inlet sewer at the lower manhole. Prior to making measurements, care shall be taken to assure that the flow over or through the measuring device is constant. A minimum of four measurements shall be made over a period of one hour.

Air Testing:

The Contractor may use a low-pressure air test at his option. The following procedures shall be used on conducting the low-pressure air test. The Contractor shall furnish all facilities and personnel for conducting the test under the observation of the Engineer. The equipment and personnel shall be subject to the approval of the Engineer.

All wyes, tees, or end of side sewer stubs shall be plugged with flexible joint caps, or acceptable alternate, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible jointed stub connection or extension. No double plugs shall be allowed.

Immediately following the pipe cleaning, the pipe installation shall be tested with low-pressure air. Air shall be slowly supplied to the plugged pipe installation until the

internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any groundwater that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.

The requirements of this specification shall be considered satisfied if the time required in seconds for the pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any groundwater is at least as follows:

Size of	Seconds per Linear foot of
4 inch	0.11
6 inch	0.25
8 inch	0.46
10 inch	0.72
12 inch	1.04
15 inch	1.63
18 inch	2.35
21 inch	3.20
24 inch	4.18

The use of air pressure for testing sewer lines creates hazards that must be recognized. The Contractor shall be certain that all plugs are securely blocked to prevent blowouts. An air supply regulator shall be installed on the air supply line to the sewer that shall permit a maximum of 10 psi in the line to be tested. All pressure shall be relieved from the sewer section being tested prior to removal of test plugs.

Testing Of Pressure Mains:

Prior to acceptance of the project, the pressure line shall be subjected to a hydrostatic pressure test of 100 psi at the high point of the line. Any leaks or imperfections developing or occurring under the test pressure shall be remedied by the Contractor before final acceptance of the project. Leakage shall be measured by approved means. Test pressure shall be maintained while the entire installation is inspected. The Contractor shall provide all necessary equipment and shall perform all work connected with the tests. Insofar as is practical, test shall be made with pipe joints and fittings exposed for inspection. Maximum allowable leakage shall be .05 gallons per hour per inch of pipe diameter per 100 feet of pipe.

Closed Circuit Television Inspection (CCTV)

The City shall require the sanitary sewer lines be inspected by a NASSCO (National Association of Sewer Service Companies) PACP (Pipeline Assessment Certification Program) certified individual using a CCTV system prior to final acceptance. Proof of the individual's certification shall be provided to the City prior to the inspection. The costs of making the initial inspection shall be borne by the Developer. The Contractor shall bear all costs incurred in correction of deficiencies found during the television inspection. The Contractor maybe required by the City to verify the correction of said

deficiency. The Developer shall provide the City with the CCTV inspection of the sanitary sewer system prior to final project acceptance.

If defects are found or suspected during the one-year warranty period, the City may also require that the Developer provide video inspection of any or all sanitary sewers before expiration of the warranty.

The Contractor shall correct all deficiencies found during CCTV inspection.

The Contractor shall provide color CCTV equipment shall include television cameras, a television monitor, cables, power sources, side-launch capable if necessary, and other equipment. Focal distance shall be adjustable through a range from 6 inches to infinity. The CCTV equipment shall include a distance measuring instrument (DMI) to measure the horizontal distance traveled by the camera. The DMI readout shall appear continuously on the video produced by the inspection and shall be accurate to less than 1 percent error over the length of the section of pipeline being inspected. For storm or sanitary sewers, the length is measured from the centerline of the manhole or catch basin to the centerline of the next manhole or catch basin.

The CCTV inspection system shall be performed utilizing one of the following video camera systems:

- Remote-focus stationary lens cameras; or
- Rotating lens cameras; or
- Pan-and-tilt cameras

The CCTV camera shall be mounted on a skid, floatable raft system, or transporter based on the conditions of the pipeline to be televised. Telephones, radios, or other suitable means of communication shall be utilized to ensure communication exists between members of the crew. The contractor shall inspect the pipeline during optimum low-flow level conditions, as pre-approved by the Construction Inspector. The contractor shall coordinate with the Construction Inspector prior to video inspection. The television camera utilized shall be specifically designed and constructed for sewer inspection. The camera shall be operative in 100 percent humidity conditions. Lighting for the camera shall minimize reflective glare. Lighting and picture quality shall be suitable to provide a clear, in-focus picture of the entire periphery of the pipeline for all conditions encountered during the work. If the quality of the video is deemed to be unacceptable by the Construction Inspector, the pipeline shall be re-televised at no cost to the City. The camera shall be moved through the pipeline at a uniform rate, stopping when necessary to ensure proper documentation of the pipeline condition, but in no case shall the television camera be moved at a speed greater than 30 feet per minute stopping when necessary to ensure proper documentation of the pipe condition. The video shall be taken after installation, cleaning, and pressure test to ensure that no defects exist. The project will not be accepted until all defects have been repaired.

Data Requirements

The contractor will provide inspection/observation data certified for NASSCO PACP version 6.0 or newer. The contractor's software for condition assessment video recording must be submitted to and approved by the City.

Video Media Requirements

Video media must be recorded in color at a minimum of 640 x 480 resolution with a minimum frame rate of 30 frames per second. The digital video compression will be MPEG-1. The audio portion must be embedded in the video file (not a separate audio file) and shall be sufficiently free from electrical interference and background noise to provide complete and intelligible oral reporting.

Video File Name Requirements

Video file names should contain the pipe segment asset number being inspected, the date and time of the video inspection, and optionally a sequence number if multiple inspections are performed. (e.g., '123456-20151231.MPG')

Photo Media Requirements

Photo media must be in JPEG format with a minimum of 16 bits per pixel color depth. Photo resolution should be high enough to capture adequate details of an observation/defect.

Photo File Name Requirements

Photo file names should contain the pipe segment asset number being inspected, the date and time of the video inspection, the observation code, the distance from the inspection starting point, and optionally a sequence number if multiple photos are taken for the same observation. (e.g., '123456-20151231-DAGS-35FT.JPG')

Media Delivery Requirements

Acceptable digital medium for the delivery of the data to City of Issaquah shall be PDF for inspection document, JPEG for photos and MPEG for video submitted via an electronic upload (details will be provided when data is ready for submittal).

I. Guarantee by Manufacture

If requested by the City, a written guarantee made by the manufacturer of any materials to be incorporated into the work shall be furnished, guaranteeing to the City that such materials shall conform to the Specifications applying to the work.

J. Warranty

The Contractor is required to provide a warranty to the City for facilities constructed for the City. This warranty will be for a period of not less than one (1) year from the date of final acceptance by the City and will cover material and workmanship defects including but not limited to: asphalt, concrete, piping, manholes, frames and covers, landscaping and 12-month plant establishment period and settlement of trenches below City roadways regardless of whether the trench contained a City utility or privately owned utility.

K. Security

Performance Security: A security is required per IMC such as; Chapters 12.12, 16.26, and 18.04 to guarantee the performance of, completion, or corrections to, permitted work. The amount of security shall cover the City's cost to perform the necessary work in accordance with IMC 16.26. When performing work within city right-of-way, on City owned or future City utilities refer to IMC 18.04 for types of securities required.

Securities shall be processed for release by the City upon written final acceptance of the improvements and the plans have been certified "As-Built" record drawings by the Professional Engineer of Work/Record and the Record Drawings approved by the City, all final reports submitted and approved as required and the Warranty Security is posted.

Warranty Security: A security is required during the warranty period to ensure adequate funds for the City to perform the necessary warranty work should the developer not do so for improvements against any defective work or labor done or defective materials used in the performance of the improvements throughout the warranty period. The warranty period shall be of one year following completion and acceptance of the improvements unless a longer warranty period is required by the City Engineer. The utility security shall be not less than 30% of the total construction cost of the public facilities accepted by the City and posted prior to the Performance Security release.

For City contracted construction projects refer to RCW 39.08.010 for required bonding.

L. Determination of "As Equal"

The City shall be sole judge whether supplies or materials qualify 'as equal' substitutions under the Plans and Specifications. Substitutions are not allowed for items specified as "required" or "sole source".

M. Easements

All easements required shall be obtained by the Developer without cost to the City and shall provide for a permanent easement and construction easement as shown on the Plans. The Developer shall provide the City with supporting data to verify the location of all easements. In the event that legal services are required incident to easements beyond review of the form thereof, the Developer shall pay the costs of such service.

Any required easements shall be obtained (in the name of the City) by Developer at their expense using the City's standard form. Recorded easements shall be delivered prior to acceptance of said improvement, or project close-out, and the original easement shall be delivered to the City. The Developer shall provide all necessary easements at his sole cost regardless of changes in the Contract Plans. The City will require the Developer to provide a survey of the record drawing improvement to verify its location in the easement. All easements shall be explicitly called out as to rights and obligations on the final plat.

General Easement requirements for improvements not located in the right-of-way are as follows (evaluated on a case-by-case basis):

Off-site easements (e.g., easements across property not owned by the development, temporary construction easements), at a minimum, are required prior to permit issuance.

Sanitary Sewer: Fifteen (15) foot easement over all main line sewer lines and appurtenances not located in a multifamily or commercial development, or as otherwise required.

N. Defective Work and Corrective Action

During construction, work that is found by the City not to comply with the Plans and Specifications shall be remedied to comply therewith. Subsequent to completion and within one year after the work has been accepted by the City, the Developer shall correct or replace any defective work or material discovered by the City. Such correction or replacement shall commence within seven days from the time of receipt of notice from the City and shall be completed promptly.

If not so commenced, or, in emergency, when damage may result from delay, such correction or replacement may be made by the City at the expense of the Developer. The Developer shall reimburse the City, upon demand, for any expense resulting from defects that appear within one year after acceptance of the Developer's work. This includes actual damages, costs of materials and labor expended by the City in making emergency repairs, costs of legal expense, attorney's fees and costs reasonably incurred by the City as a result thereof.

Inspection and project acceptance do not relieve the Developer from the responsibility to provide complete and properly functioning improvements. All corrections required to correct deficiencies shall be borne by the Developer.

4. DESIGN

A. *Design Standards*

These Design Standards along with Washington State Dept. of Ecology (DOE) "Criteria for Sewage Works Design" shall set forth minimum standards for the planning, design, and construction of sewer facilities. The work shall be done in accordance with the Plans and Specifications prepared by the Engineer and approved by the City. These Standards do not include design of special facilities such as Lift Stations. These special facilities require unique design requirements and will be subject to individual review by the City. All work and materials not specifically referenced shall conform to AWWA, APWA or the APWA/WSDOT standards. As a preliminary guide, the following general standards of construction and materials are set forth:

1. Design shall comply with the Issaquah Municipal Code (IMC), policies and criteria set forth in the City of Issaquah's Sewer System Plan, and design requirements as defined within these Standards.
2. The extension shall incorporate adequate capacity and alignment to provide for future expansion of the system in conformity with the City's comprehensive planning and future needs.
3. Pipe sizes and grades shall be selected in accordance with good engineering practice. No grade shall be permitted resulting in a velocity of less than two feet per second at design flow. Lines shall be on straight alignment and uniform grade between manholes.
4. All lines shall be a sufficient depth to drain basements and be protected against damage by frost and traffic, storm water, surface water or ground water shall be discharged into sanitary sewers.
5. If slope and volume are such that velocities above twelve feet per second are realized at average flow, special provisions shall be made for anchoring the pipe and providing against erosion and shock.
6. All sanitary sewer design shall be by gravity flow, except by special arrangement with the City. Lift stations shall be avoided if possible.
7. A manhole shall be provided at each grade, alignment, size change and at the start or dead end of a sewer main. No distances in excess of 400 feet shall be permitted between manholes in lines of fifteen (15) inches or less and 500 feet for sewers eighteen (18) to thirty (30) inches.
8. New and replacement sanitary sewer systems shall be designed to eliminate or minimize infiltration of surface waters. For manholes located in the curb and gutter line, flood plains, or flooding areas in easements, the installation of gasketed ring and cover or inlet is required.
9. Insofar as practically possible, lines shall be located in public roads in preference to easements.
10. All manholes shall be forty-eight (48) inch minimum diameter. Manholes over fifteen (15) feet in depth shall be a minimum of sixty (60) inches in diameter. Diameter shall also be determined by pipes entering the manhole in accordance with WSDOT specifications.
11. New sewer mains shall connect to existing sewer main at existing manholes, or with new manhole on existing sewer main.
12. Oil Water Separator is required whenever an industrial or commercial business generates mineral/petroleum/non-biodegradable cutting oils to be discharged to the sanitary sewer. An oil/water separation device shall be installed by the property owner. Selection and sizing of an oil/water separator shall conform to the Uniform Plumbing Code (latest edition) and be subject to approval of the Engineer. Sizing of a separator facility shall be based upon a forty-five-minute retention time in the separator.
13. Grease interceptor/pretreatment shall be required whenever a commercial and/or retail food preparation operation, regardless of size, generates animal/vegetable fats, oils, or grease (F.O.G.) waste to be discharged to the sanitary sewer. A grease interceptor shall be installed by the property owner. Effluent discharged from any grease interceptor shall not contain a

visible sheen or accumulations of F.O.G. and shall be in compliance with City of Issaquah regulations (such as IMC Title 18) for discharge to the sanitary sewer. Selection and sizing of an oil/water separator shall conform to the Uniform Plumbing Code (latest edition) with a minimum capacity of 1,000 gallons and be subject to approval of the Engineer. At no time can the discharge from the grease interceptor exceed 100 mg/L total oil and grease concentration, or visible oil sheen.

14. Garbage areas and enclosures, car wash area, and vehicle service areas shall be conveyed to the sanitary sewer system. Uncovered areas exceeding 200 square feet are not approved for discharge to the sanitary sewer system and must be covered.
15. All sewer facilities installed within paved areas and subject to traffic shall be designed to withstand HS-25/HL-93 load requirements.
16. Grinder Pumps – Private, shall be designed in accordance with DOE’s Criteria for Sewage Works Design, section C1-10.1. The assembly shall be located adjacent to the servicing structure and equipped with audio and visual alarms for high level and pump failure. Pumps shall be submersible duplex grinder pump (simplex maybe acceptable for single family homes). The design shall be in conformance with Materials section 4, and Details S-18 and S-19 of these standards.
17. Developer/Contractor to purchase “Best” brand padlocks and/or cores from the City, for all lockable doors, lids, gates, bollards, hatches and/or closures to be assumed/owned by the City. Coordinate with City Inspector to order.

B. Materials

1. General

All materials incorporated into the work shall conform to the provisions of this part and be new and undamaged. Where possible, the same manufacturer of each item shall be used throughout the job. All references to specifications shall be of the latest edition.

2. Guarantee By Manufacturer

If requested by the City, a written guarantee made by the manufacturer of any materials to be incorporated into the work shall be furnished, guaranteeing to the City that such materials shall conform to these Specifications and the Specifications otherwise applying to the work.

3. Sewer Pipe And Appurtenances, (Pressure and Non-Pressure)

Gravity sewer pipe shall be PVC, HDPE, or ductile iron pipe as specified herein. The sewer pipe shall be clearly marked with the type, class, thickness, date, and manufacturer. The lettering shall be legible and printed at the factor. All pipe and fittings shall be Domestic.

a) PVC PIPE

PVC pipe shall conform to ASTM D3034 or F-679 and shall be defined as flexible conduit. Joints shall conform to ASTM D3212 using a restrained rubber gasket conforming to ASTM ~477. Fittings shall be injection molded tees or factory solvent welded saddle tees. Saddles fastened to pipe with external bands are not acceptable on any new system.

b) HDPE Pipe

HDPE pipe shall be only used for transmission mains with no laterals or in special installations such as sensitive/critical areas and steep slopes as approved by the City. Butt fused/welded HDPE pipe shall conform to ASTM D3350. Fusing will be performed by Certified Personnel. Cut and remove interior bead from fused pipe.

c) Ductile Iron Pipe

All ductile iron pipe shall be AWWA C151 Class 52 conforming to ASTM A716/A746 with Protect 401 Ceramic Epoxy Lining.

4. Private Force Mains

General Requirements:

- a) A private sewer lift station shall be allowed on a case-by-case situation, if in agreement with the City, a gravity main is infeasible due to topography or elevation constraints.
- b) If public sewer is not available at the property, and topography requires a pressure system within public right of way, a system shall be allowed under the following conditions and circumstances:
 - a. A private pressure system located on public right of way will only be allowed if all other options for sewer conveyance or disposal are not available, in the opinion of the City, including analysis that an on-site septic system is not feasible due to high groundwater, poor soils, proximity to environmentally sensitive areas, or other site restrictions as determined by a Licensed Septic System Designer and approved by the City. On-site septic system installation shall be in accordance with IMC 13.80.040.
 - b. A pressure system shall only be allowed for a single property owner. If a property owner elects to subdivide a property utilizing a pressure sewer system within public right of way, the owner shall pay for the public sewer extension up to the property.
 - c. Only a licensed Contractor may be issued a permit for side sewer work in a public right-of-way.
 - d. A covenant shall be signed by the property owner to:
 - i. Maintain the private connection up to the public main.
 - ii. Replace any private components impacted by public infrastructure improvements
 - iii. Connect to the public sewer when it becomes available, pay all connection fees and associated sewer extension fees, and decommission, disassemble, and remove all private components from public right of way upon connection.

Single-Family Lift Stations – Specific Requirements:

- a) Lift station to be a minimum of a simplex system (one pump).
- b) There shall be a minimum of three mercury level control floats: one for turning the pump ON, the second for turning the pump OFF, and the third for a high-water alarm.
- c) Grinder pump shall be two horsepower minimum, which is adequate for a single residence with up to 70 feet of head.
- d) Audio and visual alarm panel to be located inside the single-family residence.
- e) If a lift station is present, single-family homeowners shall either have a back-up power generator on-site or a connection point on the lift station control panel for a generator connection.

Commercial Property Lift stations – Specific Requirements:

- a) Lift station to be a duplex system (dual pumps) and must be designed by a licensed professional engineer.

- b) Audio and visual alarms are required. Alarms are to be located within the building structure near the maintenance office or property manager's office.

Materials and construction requirements:

a) Grinder Pump System:

- a. All pumps within lift stations must be submersible grinder pumps, manufactured by Hydromatic or City approved equal.
- b. All equipment and accessories shall be standard manufactured items and those coming in direct contact with sewage shall be specifically manufactured for such use.
- c. The pressure piping downstream of the lift station must tie into a 6-inch side sewer which flows by gravity into the sewer main. Pressure systems are for single lots and not connected to shared side sewers. No direct connections of force laterals and sewer mains will be allowed without City approval. See Standard Details S-17 and S-18.
- d. Lift station chamber must be either concrete or fiberglass.
- e. Pre-designed lift station packages are acceptable.
- f. The grinder pump tank shall be installed so that the tank cover is approximately 3-inches above finish grade. Finish grade shall be free draining around and away from the tank so that surface water cannot pond around the station.
- g. No plants, fences, carports, buildings, retaining walls or other obstructions are to be located within 5 feet of the tank, valve boxes, or side sewer. The property owner shall maintain a 5-foot clear zone around the tank.

b) Pipe:

- a. Pressure laterals shall be thermal fused high-density polyethylene plastic pipe (HDPE SDR 11). Run tracer wire along length of force main/lateral pipe, or ductile iron pipe with restrained joints.

Fittings:

- a) Pipe fittings shall be:
 - b) Threaded schedule 80 PVC – Only where PVC parts are required by standard details. Compression couplings shall only be allowed as part of the Grinder Pump Cleanout and Collection Valve Box as shown in the standard details
 - c) HDPE Pipe and Fittings
 - d) All HDPE pipe and fittings shall be SDR 11 with either electro-fusion fittings or butt welding. The Contractor that performs all HDPE joints shall be certified in electro-fusion and/or butt-welding techniques.
 - e) Connection of HDPE pipe to any threaded fitting as shown in the standard details will be with a full-bore HDPE x 316 stainless steel transition fitting, 6-inches in length.

Electrical Components

- a) The pump control panel shall be attached to the owner's house, or with the City's approval, attached to a 4x4 pressure treated post set 3-feet into concrete. The panel shall be installed so that:
- b) The bottom of the panel is 4.5 feet above finished grade,
- c) Is visible from the tank,
- d) Is within 12-feet of the grinder pump tank, unless otherwise approved by the City.
- e) The alarm light is visible from 50-feet and has a 180-degree visual radius.
- f) A single PVC electrical conduit shall be installed between the electrical junction box and Pump Control Panel.
- g) An explosive gas seal-off fitting shall be installed in the electrical conduit just prior to the Pump Control Panel.
- h) The power and control wires between the grinder pump and the electrical junction box shall be installed in two separate PVC conduits in accordance with the Standard Details.
- i) Electrical work shall be permitted and be in compliance with the National Electric Code.

Miscellaneous

- a) Pressure sewers shall only be constructed under water lines with ductile iron pipe or standard sewer pipe in a steel casing for a distance of at least ten (10) feet on each side of the crossing.

Testing

- a) Pressure laterals require a 15-minute, 25 psi air test with no pressure drop.
- b) The lift station must be cycled on/off ten times to ensure all floats and alarms function properly before being signed off by the City. This test must be witnessed by the City's inspector.

Connections to Public Sewer

- a) Connection to gravity main
 - i. Connections to an existing gravity sanitary sewer shall require a 6-inch PVC gravity side sewer. If necessary, the Contractor shall install a gravity side sewer.
 - ii. The transition between the HDPE pressure side sewer and the gravity side sewer shall require the installation of a Pressure Line Connection to Gravity Sanitary Sewer connection per Standard Detail S-18, including installation of the 6-inch cleanout assembly at the property line. The typical Collection Valve Box will not be required as part of the connection to a gravity sanitary sewer.
- b) Connection to a gravity manhole:

- i. Where a HDPE pressure side sewer is connecting into a gravity manhole, the Side Sewer Contractor shall install an inside drop connection on those manholes deeper than 6 feet. In manholes less than 6 feet deep the connection must match the crown elevation of the outfall pipe. All manhole penetrations shall meet the requirements of the City. A maximum of four pressure connections are allowed per manhole, unless approved by the City. See Detail S-17.
- c) Private force main in right of way
- i. Where allowed by City approval a private force main on public right of way shall contain one cleanout for every 500' of length and at each elbow greater than 22 ½ degrees. Place locator tape on cap when outside of paved surface.
 - ii. Private force mains shall contain a clean out on private property.
 - iii. Air Release/Vacuum Breaker Valves shall be required at high points in the force main.

5. Manholes

a) Frames and Covers

Frames and covers shall be as identified in the Approved Materials list or equivalent. Covers shall conform to ASTM A536 and frames shall conform to the requirements of ASTM A48, Class 35B. Both shall be free of porosity, shrink cavities, cold shuts, or cracks or any surface defects which would impair service ability. Repair or defects by welding, or the use of "smooth-on" or similar material will not be permitted.

Manhole frames and covers shall be machine finished or ground on seating surfaces to assure non-rocking fit in any position, and interchangeability. At the request of the City, there shall be made available at the foundry standard rings and standard covers for use by inspectors in testing fit and seating. Manholes located outside of public rights-of-way shall be bolt-locking.

At the request of the City, there shall be made available at the foundry a testing device suitable for proving the capacity of the assembly to resist an uplift pressure on the lid equal to a 20-foot head.

Manhole frames and covers shall be identified by the name or symbol of the manufacturer. This identification shall be in a plainly visible location when the frame and cover is installed. The manufacturer's identification and the material identification shall be adjacent to each other and shall be minimum 1/2-inch letters recessed to be flush with the adjacent surfaces.

b) PRECAST MANHOLE COMPONENTS

Precast manhole components shall conform to ASTM C478 and C443 except as modified herein.

Manhole riser sections shall be precast concrete sections with confined O-ring gasket joints. Manhole bases shall be precast base with either separate or integral riser. Shop drawings of the joint design may be required by the Engineer for approval, prior to manufacture or purchase. Pipe connections to manhole shall be Kor-N-Seal or equal for core drilled sections, or sand collar for sections with knockouts.

Drop manholes, wherever shown on the plans, shall conform in all respects to the requirements for standard manholes as specified herein. Pipe and fitting materials shall be C900 PVC and shall conform to the specifications for AWWA C900 or C907.

Standard precast cones shall provide an eccentric reduction from forty-eight (48) inches to twenty-four (24) inches and shall not be less than seventeen (17) inches in height.

Precast cones shall conform to Section 63-2.09C of the Standard Specifications. Precast flat slab covers shall conform to Section 63-2.09D of the Standard Specifications.

c) **Ladders and Steps**

Steps and ladders shall conform to Standard Detail G-12. Steps shall be installed to form a continuous vertical, uniform ladder, with rungs equally spaced at twelve (12) inches. The lowest rung shall be no more than sixteen (16) inches above the shelf and the uppermost rung shall be not more than eighteen (18) inches below the cover.

Precast manhole base sections more than three feet in height shall be provided with a hanging ladder. Ladders shall be made of polypropylene.

d) ***Liner Inserts, Painting/Sealing***

In instances where high velocity flows entering the manhole can potentially erode the interior wall(s), the City may require an epoxy based structural lining system be installed in the new or existing manhole. This is applicable in areas with steep pipe slopes, in areas where high rise buildings (typically four or more stories) discharge directly into one manhole, drop structures with high projected flows, and manholes downstream of public/large lift stations. The epoxy-based liner shall be installed per the manufacturer's specifications. Approved epoxy lining systems shall be Raven 404, Neopoxy, or City approved equal.

6. Oil/Water Separator and Grease Interceptor

Oil/Water Separator and Grease Interceptor vaults shall be of precast concrete construction having a minimum 28-day compressive strength of 4,500 PSI. Deformed bars for steel reinforcement shall be in accordance with ASTM A615, grade 60. Welded wire fabric reinforcement shall be in accordance with ASTM A185, grade 65. All interior piping shall be PVC, sized to match side sewer line size.

7. Bedding Concrete

Bedding concrete shall be mixed from materials acceptable to the City Engineer. See General Standard Detail G-13 Pipe Bedding.

8. Bedding Material

Pipe zone bedding material shall be processed or naturally occurring granular material free from organic materials or other extraneous or objectionable materials. The material shall have such characteristics of size and shape that meet the specifications for grading and quantity as defined

in WSDOT Standard Specs. Pea Gravel maybe used with the City Engineer's approval. See General Standard Detail G-13 Pipe Bedding.

9. Imported Backfill Material

Imported backfill material, known as "Common Borrow", shall consist of no rocks greater than 3" in any dimension, be free from wood, bark, roots or other extraneous material, and shall meet the specifications as further defined in WSDOT Standard Specs. 9-03.14(3). Recycled concrete shall not be used for backfill material.

10. Asphalt Concrete

Hot Mix Asphalt (HMA) pavement shall conform to the technical requirements of the WSDOT Standard Spec. 5-04 for HMA CI 1/2" (wearing) or CI 1"(other).

11. Crushed Surfacing

For use in the restoration of excavated areas, Base Course, Top Course and Keystone material shall be crushed gravel, free from wood, roots, bark, and other extraneous materials and shall conform to WSDOT Standard Specs. 9-03.9(3). Recycled concrete shall not be used for erosion protection, construction entrance, or temporary stabilization on site.

C. Setbacks and Clearances from other Utilities

All clearances listed below are from edge-to-edge of each pipe.

1. Clearances - Horizontal clearances from sewer mains and side sewers

- a. Cable TV 5 feet
- b. Gas 5 feet
- c. Power 5 feet
- d. Stormwater 5 feet
- e. Telephone, Fiber Optics 5 feet
- f. Water 10 feet

2. Vertical clearances from sewer mains and side sewers

- a. Cable TV 1 foot
- b. Gas 1 foot
- c. Power 1 foot
- d. Stormwater 1 foot
- e. Telephone, Fiber Optics 1 foot
- f. Water 2 feet

3. For open channels, horizontal and vertical clearance requirements will be determined on a case-by-case basis.

4. Parallel Utilities - Check for crossing or parallel utilities. Avoid crossing at highly acute angles (the smallest angle measure between utilities should be between 45 and 90 degrees).

5. Crossing Water Mains - Where sewer pipes cross over or below a water main, one full length of pipe shall be used with the pipes centered for maximum joint separation.
6. Utilities Coordination - Send a letter and preliminary plan to existing utilities to inform them of new construction. Request as-built information and incorporate into plans. At a minimum, the following utilities should be contacted: cable television, natural gas, power, sanitary sewer, telephone, water, and telecommunications companies.

5. CONSTRUCTION

A. General

Except as otherwise noted herein, all work shall be done in accordance with the plans and specifications approved by the City and as recommended in applicable American Water Works Association (AWWA) specifications and/or the Washington State Chapter, American Public Works Association (APWA), and according to the recommendations of the manufacturer of the material or equipment used.

All construction covered by these standards shall conform to its specifications. In the event any other standard has been adopted by the City which conflicts with the Standard Specifications adopted in this section, the standard which better protects the public health, safety, and welfare as determined by the City shall control.

The City shall always have access to the work for the purpose of inspecting and testing, and the Contractor shall provide proper facilities for such access and such inspection and testing. If any work is covered up without approval or consent of the City, it must, if required by the City Engineer, be uncovered for inspection.

Necessary sanitation convenience for the use of workmen on the job, properly secluded from public observation, shall be provided, and maintained during the performance of the work.

Before commencing any construction work as described in the plans and specifications, the Contractor shall provide photographs of pre-existing conditions of the area that will be disturbed during construction operations. Photographs will be obtained as follows:

1. Every 25 feet interval in easements.
2. Every 50 feet interval in paved areas, and
3. Any other location as directed by the Engineer.

The photographs shall be taken with a high-resolution digital camera.

B. Underground Utilities

The plans shall show as accurately as possible the locations of various existing utilities known to the Engineer, such as gas lines, water mains, storm drainage, sewer mains, power lines, communication lines, television cables, and other obstructions based on information obtained from various sources. This information is not guaranteed to be accurate, and the Contractor is directed to check for

interferences and obstructions by inquiry from the different utilities and by underground exploration ahead of his regular excavation.

The Contractor shall request field locates and notify the owners of underground facilities about the scheduled commencement of excavation through a One-Call number 811, 72 hours before construction for utility locations.

If a utility is not included in the one-number locator service, notice shall be provided individually to those owners of underground facilities known to or suspected of having underground facilities within the area of proposed excavation.

Notice shall be made to owners of underground utilities not less than two (2) business days or more than ten (10) business days prior to scheduled date of commencement of excavation.

The Contractor shall excavate around and under utilities with special care and shall support and maintain them in service. Where it is necessary to cut, move or reconnect any utility lines, arrangements shall be made with the respective utility.

If a water main has been field marked as unlocatable and cannot be located by hand-digging or hydro excavator, the excavator must contact the City of Issaquah project inspector to arrange for an on-site meeting. City personnel will assess risk of damage and create a mitigation plan that may include throttling a water main or standing-by while reasonable care is taken in the continuance of work.

C. Site Maintenance

The Developer or Contractor shall schedule and control work so as to comply with the applicable provisions of the Right-of-Way Use Code and Procedures, Issaquah Municipal Code (IMC) such as; Chapter 12.12, and Chapter 16.26 Clearing, Grading, and Stormwater Management to prevent any hazards to public safety, health and welfare.

Two-way traffic shall be maintained at all times on existing streets unless detour plans or temporary traffic control plans along with public notification has been approved in advance by the City Engineer.

Streets shall be kept free of dirt, mud, staining, rocks, and other debris on a continuous basis in conformance with all applicable Issaquah Municipal Codes and approved TESC plans.

Pedestrian facilities, to and from the fronting of the site, shall be kept free of obstructions, safety hazards and continuity maintained at all times. Pedestrian routes must be secure for weekends and holidays.

Pedestrian and vehicular access to occupied buildings shall be maintained at all times except where prior approval from the building owner and City has been obtained.

Maintenance access shall be provided at all times to all existing City Utility appurtenances that require routine maintenance or emergency access.

Public or private utilities, driveways, roadways, pipelines, or other existing improvements, which are removed or disturbed in the course of the work, shall be restored to their original condition at the expense of the Developer or contractor performing the work. In cutting through established lawns, the

sod shall be removed before trenching and replaced after back filling to the satisfaction of the property owner. A signed release from the affected property owner will be required.

In the case of existing underground utilities, the developer shall ensure that access (valves, manholes, etc.) to said utilities is maintained at all times. Sewer utility access, manholes covers, valve covers, survey monuments, etc. covered by paving operations shall be immediately uncovered and then raised to grade within five (5) days. Unidentified utilities shall be raised to grade and brought to the attention of the City.

The construction site shall be kept clean during the progress of the work. Before the work shall be considered complete, the Contractor shall clean out ditches and pipes that may have been filled during the work, replace damaged surfacing, remove surplus materials, and trash and dispose of brush, repair all damages, and otherwise leave the job in a neat, orderly, and workmanlike condition.

Protective fences are to be installed (silt, tree protection, slope, wetland, native growth protection easements, limits of clearing) prior to clearing, grading, or excavating.

Where indicated on the Plans, a bright orange safety fence shall be placed parallel to the silt fence, 2 feet nearer to the construction activity. Top of fence shall be located 3 feet above ground. The fence shall be supported as recommended by the manufacturer and as directed by the Engineer.

The contractor shall apply water in the amounts needed at the locations necessary to provide adequate dust control. The contractor shall also maintain this control for the evening and weekends. Permission to draw water from a city fire hydrant must be granted by a permit available from the City of Issaquah Public Works Department (425) 837-3470.

The contractor shall use the appropriate pollution control measures to ensure that no liquid products or contaminated water (such as runoff from concrete slurry) enters the storm drainage system, surface waters, or otherwise leaves the project site. For appropriate best management practices, refer to the 2012/2014 Storm Water Management Manual for Western WA, Volume 4.

A Temporary Erosion & Sediment Control (TESC) preconstruction meeting shall be held before any work begins at the project site to review implementation of the TESC plans and confirm discharge NTU limit. The approved TESC plans shall be followed at all times and revised as needed to address construction sequencing, changed site conditions, or unforeseen circumstances.

Any discharge to a stream, lake or wetland shall not exceed water quality standards per WAC 173-201A (as low as 5 NTU above background). Discharge above 25 NTUs to the City stormwater system requires notification to the TESC Supervisor, so that action can be taken to keep discharges below threshold levels. Discharge at or above 100 NTU requires notification to the City. Discharge from the project site shall not exceed the NTU limit at all times up to the 10 year/24-hour storm event. This event is defined as 3.5 inches of rainfall over a 24-hour period, as measured at the City's rain gage. Data from this rain gage is posted on the City's website.

All work within easements shall be performed strictly in accordance with easement provisions. Easements shall be restored equal to or better than original condition. The Contractor shall do no work within easement areas until specifically authorized by the City Engineer or Construction Inspector. A signed and written release from the easement grantor shall be furnished to the City Engineer or Construction Inspector prior to permit signoff.

D. Trench Dewatering

When water is encountered to a degree that a successful trenching and pipe laying operation is hampered, Contractor shall control the water in order to allow for the proper installation and backfilling of the pipe. Determination of the method to be used to dewater trenched areas will be the responsibility of the Contractor, but any method used must be in accordance with the specifications and requirements of the Washington State Department of Ecology and the City. Pumping any water off-site is not allowed without prior approval from the City of Issaquah. Discharges to the public stormwater drainage system must be below 100ntu, and not considered a prohibited discharge (per IMC 13.28.025).

E. Trench Excavation

Trenches shall be excavated to the line and grade approved by the City. Unless otherwise specified, trench sides shall be excavated vertically. Trench widths shall be adequate for proper working space and placement of bedding material under and around the pipe. The trench width from the bottom of the trench to the crown of the pipe shall not exceed thirty (30) inches for twelve (12) inch diameter and smaller pipe, or 1.5 times the inside diameter of twelve (12) inch or larger pipe, plus sixteen (16) inches. If these widths are exceeded, a stronger grade of pipe and/or a higher classification and amount of bedding material shall be furnished, as directed by the City.

The trench shall be kept free from water until jointing is complete. Surface water shall be diverted so as not to enter the trench. The Contractor shall maintain enough pumping equipment on the job to ensure that these provisions are carried out. Gravel required in the bottom of the trench due to action of weather or workers shall be furnished by the Contractor without expense to the City. Boulders, rocks, logs, roots, and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth six (6) inches below grade. Where material is removed from below grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.

Excavation for manholes or other structures shall be sufficient to provide a minimum of eighteen (18) inches between their outer surfaces and the sides of the excavation.

Trenching operations shall not proceed more than 50 feet in advance of pipe lying, except with written approval of the City.

Roadway paving shall be cut ahead of the trenching equipment to prevent excessive tearing up of the surfacing and to eliminate ragged edges.

Where the soil encountered in the bottom of the trench is unstable and unsuitable as a base for pipe, such soil shall be removed to a depth specified by the Engineer to provide uniform and stable bedding for the pipe.

All material excavated from trenches, and piled adjacent to the trench, shall be placed, and maintained so that the top of the material is at least two (2) feet from the edge of the trench. Excavated material shall be located so that free access is provided to all fire hydrants, water valves and meters and other utilities and clearance shall be left to enable free flow of storm water and all gutters, conduits, and natural water courses.

Providing saw cutting, excavation, disposal, hauling, sheeting, shoring, cribbing, cofferdams, and all aspects involved therein shall be the sole responsibility of the Contractor.

F. Trenchless Shoring

The use of trenchless construction methods such as pipe bursting and horizontal directional drilling shall be considered by the City on a case-by-case basis under the following conditions:

- HDPE DR 26 or thicker-walled pipe required.
- Romac 501 transition couplings (4") are required at both ends.
- The installed pipe must be electronically located and marked on the ground for measurement in order to draw the record drawings.
- The pipe must be video inspected following installation, with water running. The video must be provided to the Inspector to approve the installation or require corrections.
- Pipe bursting is not allowed on private property or Right-of-Way without the appropriate permission, such as an easement or Right-of-Way use permit.

G. Sheet Piling And Shoring

The Contractor shall provide and install sheet piling and shoring as necessary to protect workmen, the work and existing utilities, and other properties in compliance with OSHA and WISHA requirements. All sheet piling and shoring above the pipe shall be removed prior to backfilling.

All trenches and excavations more than 4 feet in depth shall be shored in compliance with applicable Federal and State regulations. Shoring shall be required in all street excavations. Sloping to the angle of repose will be permitted only in non-critical off-street areas.

Removal of the sheet piling and shoring shall be accomplished in such a manner that there will be no damage to the work or to the other properties.

Damages resulting from improper shoring, failure to shore or when removing shoring shall be the sole responsibility of the Contractor.

H. Boring

The contractor shall bore in lieu of trenching in areas specifically directed to do so by the City. For City projects, the City will provide specific, detailed specifications for the boring operations.

I. Roadway And Railway Crossings

Approved methods will be used for roadway or railway crossings which provide for satisfactory results and is acceptable to both the City and the Governmental or private agency having control of the road or track, provided that the road or track shall be restored to its original condition after the crossing is completed.

Where boring or jacking is elected or required for crossings steel, or class 52 ductile iron casing shall be placed, and the sewer pipe laid within the casing.

J. Trench Foundation

If, in judgement of the City, the native trench bottom will provide a firm base for the subsequent placement of bedding, pipe and backfill, such native bottom may be used if the bottom is leveled and

smoothed so that the entire length of pipe will rest on a well compacted base. Trench bottoms shall be over-excavated as necessary to remove all unstable soil and eliminate "inboiling" or "quick" conditions to such a depth as to provide a firm base. Over-excavated materials shall be replaced with trench foundation material in accordance with General Standard G-01. Foundation material shall be placed when ordered by City.

K. Bedding Material Placement

The bedding shall be placed per COI Standard Detail G-13, Pipe Bedding. Bedding material shall be worked by hand under, around and over the pipe to the depths required for the full width of the trench.

- A. The first lift to provide at least four (4) inches thickness under any portion of the pipe shall be placed before the pipe is installed and shall be spread smoothly so that the pipe is uniformly supported along the barrel. Subsequent lifts of not more than six (6) inches thickness shall be placed to four (4) inches over the crown on the pipe and individually compacted to 95% of maximum density.
- B. In solid rock excavation, all ledge rock, boulders, or stones shall be removed to provide a minimum clearance of eight (8) inches under the pipe. All material thus removed shall be replaced with bedding material.

L. Grade Lines

The Contractor shall maintain the correct grades between manholes. All benchmarks, reference points and stakes shall be preserved and, in case of destruction to any of them, the resulting expense of restoration shall be borne by the Developer.

Construction staking shall consist of grade stakes at ten (10) foot offsets at each manhole, intermediate stakes shall be offset ten (10) feet and located at fifty (50) foot stations between manholes. Laser beam equipment for grade and alignment control shall be required.

M. Pipe Laying

Each pipe shall be laid with bells up grade and the invert of the pipe to the alignment and grade shown on the plans. Concentric joints shall be closed, and a smooth invert provided. Open ends of pipe or fittings shall be temporarily capped or plugged when laying is not in progress.

If Ductile Iron piping is used, then work shall be accomplished in accordance with AWWA Standard C600 and the manufacturer's recommendations unless specifically contradicted by these Specifications. Special care shall be taken in handling pipe to avoid damaging ends, coatings, and linings.

As with "Trench Excavation", no water shall be allowed in the trench during pipe laying, joint making and as long thereafter as is necessary in the judgment of the City for the type of joint being used.

Adjustment to the line and grade shall be done by scraping away or filling in and tamping bedding material under the body of the pipe. No wedging or blocking of the pipe for adjustment to line and grade may be done.

The pipe shall be lowered into the trench by means of ropes, tripod, crane, or any other suitable means, shall not be dropped or handled roughly, and shall be checked for cracks and defects prior to installation. Any cracked or defective pipe shall not be installed.

Tees, wyes and standing services shall be installed as shown in the standard details herein and at such

locations as are shown on the plans or as otherwise directed by the City and shall not be covered until the City has completed inspection and exact location has been recorded on the as-built drawings.

Variance from established line and grade shall not be greater than 1/32nd of an inch per inch of pipe diameter but shall not exceed 1/2 inch or result in a level or reverse sloping invert. Variation in the invert elevation between adjoining ends or pipe due to nonconcentricity of joining surface and pipe interior surfaces shall not exceed 1/64th of an inch per inch of pipe diameter or 1/2 inch in any event.

Plugs for pipe branches, stubs, or other open ends which are not to be immediately connected shall be made of an approved material and shall be secured in a place with a joint comparable to the main line joint, or stoppers may be of an integrally cast breakout design. Dissimilar pipe shall be jointed by use of a factory-fabricated adapter coupling or a pipe collar as detailed in the Standard Plans.

Upon final acceptance of the Work, all pipe and appurtenances shall be open, and cleaned at no cost to the City.

N. Pipe Joints

No joints shall be covered until examined and approved by the City. Only pipe layers experienced with the type of gasket being used in the work shall be allowed to lay pipe. On request of the city proof of such experience shall be furnished before laying may begin.

Joint material shall be installed according to the manufacturer's recommendations. After the gasket has been affixed, pipe shall be handled to avoid bumping the gasket, knocking out of position or loading it with dirt or other foreign material. Any gasket so disturbed shall be removed, replaced, cleaned- and relubricated before the joint is made.

The pipe shall be properly aligned before the joint is forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by hand, sling or crane as required to minimize lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Pipe deflection and straightening shall be avoided once the joint is home, to prevent creep of the joint.

Sufficient pressure shall be applied in making the joint to assure that the joint is home, as defined in the pipe manufacturer's standard instructions for installation. Sufficient restraint shall be applied to the line to assure the joints, once home, are held so by tamping fill under and alongside the pipe or by other appropriate means. At the end of the day's work, the last pipe laid shall be blocked in such a manner as may be required to prevent creep during downtime.

If HDPE is used then a certified technician is needed to complete fusion of pipes at ends, couplings, wye's, tees, bends, etc. Proof of certification shall be provided to the City prior to installation.

All joints and fittings for force mains shall be restrained joints and fittings.

O. Manholes

Precast manhole base sections shall be placed on a well-compacted bedding course of bedding material compacted to 95% of maximum density.' The foundation shall at the minimum meet standard detail S-01. The depth of the bedding shall not be less than six (6) inches thick, extending a minimum of twelve (12) inches beyond the outside perimeter of the base section. Additional foundation measures may be required as determined by a geotechnical engineer, directed by the City, or if unsuitable materials are

encountered. The balance of any remaining excavated area shall be filled with imported backfill material and well tamped to the level of the top of the bedding before the manhole is set in place. The bedding shall be well tamped and made smooth and level to assure uniform contact and support of the precast elements.

All lift holes and the inside and outside face of rubber gasketed joints between precast sections shall be thoroughly wetted and then filled with mortar, smoothed and all joints pointed both inside and out.

Precast sections shall be placed and aligned to provide vertical sides and vertical alignment of ladder rungs. Eccentric cone shall be positioned to allow vertical access to the ladder. The completed manhole shall be rigid, true to dimension and watertight.

Manholes set in paved streets or other paved areas shall be set to finished grade of the paving and when required, the manhole frame shall be tilted to conform to the grade on the paved surface.

Manholes not set-in paved areas shall be set at a finished grade six (6) inches higher than the surrounding terrain to prevent surface water infiltration into the system unless plans specify otherwise.

Manhole channels shall be made to conform to the sewer grade and shall be brought together with well-rounded junctions. Channel sides shall be carried up vertically to the crown elevation of the various pipes. The concrete shelf shall be smoothly finished with slopes to drain.

The openings through which pipes come into the manhole shall be completely and firmly rammed full of mortar to insure water tightness.

Where PVC conduits are used a watertight joint shall be provided where the pipe passes through the manhole wall in accordance with PVC pipe manufacturer's specifications.

P. Backfilling

No backfilling shall be performed until after the City has inspected the installation of the pipe and bedding and approved backfilling.

Backfilling shall be performed carefully so that no damage is done to the pipe or to its alignment. The City may direct the contractor to use special backfill techniques when it deemed necessary by the City Engineer.

In areas such as existing paving, or in areas to be paved, where the City determines that minor settlement would be detrimental and the native excavated material is not suitable for compaction as backfill, the trench shall be backfilled with imported backfill material.

Q. Compaction Of Backfill

In all events, compaction of backfill and backfill procedures in public rights-of-way shall at the minimum conform to the requirements of the governmental agency having jurisdiction thereof.

Backfilling shall be compacted to ninety-five percent (95%) of maximum theoretical density in all areas where paving will be placed over the backfill and to eighty-five percent (85%) of maximum theoretical density in all other areas. Measurement of compaction density shall be by the modified AASHTO method.

Compaction of backfill may be done in such manner as will accomplish the degree of compaction required herein.

Prior to compaction, the method of compaction shall be submitted to the City for approval and the method of compaction finally approved by the City shall be employed by the Contractor using good practice. If, in the judgment of the City, the excavated material cannot be compacted as specified, such material shall be replaced with imported backfill material.

When density tests are required by the City, the City will require that the services of an independent testing laboratory or county testing laboratory be employed to perform in-place density tests to ascertain whether the specified density can be or has been obtained, and the costs thereof shall be borne by the Developer.

Regardless of the approval of the City as to manner of compaction, testing, acceptance by the City or otherwise, the Developer shall repair any settlement of trenches and excavations that may occur within one year after completion and acceptance of the work by the City.

R. Cleaning And Flushing

Prior to pipe testing, all pipes shall be cleaned by jetting. No jetted water or debris shall be permitted to enter the existing sewer system. Water shall be pumped or vacced from the lines being cleaned and disposed of by the contractor at a suitable location.

S. Six Inch (6") Side Sewer From Main To Property Line

The strength class of side sewer pipe shall be the same as the sewer pipe to which it connects, and these specifications shall be applicable to side sewer work.

The slope of side sewers shall not exceed two (2) foot vertical to one (1) foot horizontal nor be less than two percent (2%). When change in slope between connecting pipes exceeds two (2) inches per foot, standard **1/8** bends shall be used. All side sewers shall be plugged, and plugs blocked.

The end of all side sewers at the property lines shall be marked with a vertical 2" X 4" board, the bottom of which shall be located at the invert of the elevation of the side sewer and top of which shall be painted white and extend three (3) feet above the ground with the depth of the sewer painted thereon.

T. Connection To The Existing System

No connections shall be made to the existing sewer system without the presence of the City. Written application for connection shall be made to the City, and the connection shall be made at a time agreed upon with the City.

Connections to existing manholes shall be made as follows: If the manhole is "live", the manhole channel shall be tightly covered to prevent debris from entering the sewer line prior to breaking into the manhole wall. Immediately after the connection is made, the new pipe shall be plugged and blocked in such a manner that no water shall enter into the existing manhole. The plug shall not be removed without permission of the City. If the existing manhole is not "live", a plug shall be installed in the downstream or discharge pipe of the existing manhole in addition to the above. Where new connections to existing manholes require an outside drop, two plugs for each drop shall be installed and blocked.

Connections to existing sewer pipe shall be made as follows: A new manhole shall be placed over the existing line. The manhole shall be precast, forty-eight-inch (48") diameter except that the base slab shall be cast in place. The new connection shall be plugged and blocked and the existing sewer pipe shall not be opened without the permission of the City.

Connections of side sewers to an existing sewer line shall be made as follows: The connection shall be made with a Romac sewer saddle tee or equal. The existing sewer pipe shall be cut or drilled to give a smooth symmetrical opening of the proper size. Each connection shall be bedded with a four inch (4) thick concrete pad poured in place to the lower quadrant of the pipe barrel. Unsuitable foundation material shall be over-excavated and replaced with bedding material.

APPENDIX A - Record Drawing Requirements And Drafting Standards

Record drawings are required for all construction projects conducted in the City of Issaquah. All Record drawings must be stamped and dated by both a State of Washington Registered Engineer and Surveyor. Record drawing drawings are required prior to request for final inspection and issuance of Certificate of Occupancy.

The following Record Drawing requirements are intended to provide a minimum guide to the engineer of record and should be used along with good engineering practices.

Each sheet of the Record drawing plans shall include the following statement along with the engineer's professional stamp, signed and dated, located at the bottom right-hand corner of the sheet when possible:

“These plans are Record Drawings and the information shown accurately reflects existing field conditions as of this date: _____”

GENERAL:

The Record Drawing Plans should consist of the design plans submitted, approved, and permitted for the construction project. The information shown shall reflect the actual construction completed under the permit with any and all deviations from the design plans. The modified design plans shall not have cross outs.

Horizontal and vertical datum to be used are NAD 83/91 and NAVD 88. Tie monumentation to at least two recognized and approved City monuments on or off site, with x, y, z coordinates for each. AutoCAD drawings are to be drafted utilizing this datum for insertion into the City base maps.

Each utility shall be shown on separate sheets with detailed information. In addition, a composite with all utilities shown together, without detailed information, and focusing on utility crossings, is required. If the project has very limited utility information, request for approval for a composite only with all detailed information may be submitted to the City's Project Manager.

The layering convention and plans symbols shall follow established standards as indicated by the American Public Works Association, Washington State Chapter.

Draft record drawings are to be submitted prior to sending hard copies. Final record drawings shall include one "D" size mylar copy, two (2) "D" size paper copies and one half-size paper copy. The digital format shall include PDF and AutoCAD ".dwg" files, latest version, submitted electronically (details will be provided when record drawings are ready for submittal). The electronic file shall include all plans, profiles, notes, and details and properly labeled with project and drawing names.

SANITARY SEWER:

Record drawing information for sanitary sewer, at minimum, should include, but not be limited to:

Plan and profiles, including line size, slope, and length, location.

All sanitary structures are to be labeled regarding type, size, function, and inverts of all pipes connected to the structure.

Manholes - Locations, types, rim/invert elevations inside/outside drops, and valving.

Sewer Line - Materials, locations, lengths, slopes, inverts, and sizes

Side Sewers - Materials, locations, lengths, sizes, and inverts at stub

Utility Easements – Locations, widths, and recording numbers

Details - Details of any unique structures or features

Private Wastewater systems – Label private system components.

TV Report - Compare TV reports to side sewer locations.

SEWER LAYER LIST

LAYER NAME	COLOR	DESCRIPTION
SS- <u>size/type</u> (see below for list of pipe types)	GREEN/ 200(Private)	All sizes and types of sewer pipes. A different layer for each size and type. For example: SS-8PVC = 8” pvc pipe or SS-12DI = 12” ductile iron, PRIVATE-SS-6PVC = private 6” pvc pipe.
SS-SIDE	GREEN/ BLUE(Private)	All side sewers
SS-MH	GREEN/ 200(Private)	All sewer manholes and cleanouts.
SS-TEXT	WHITE/ 200(Private)	Size and Type of pipes and side sewers.
SS-DESC	WHITE/ 200(Private)	All other wording besides size & type. This will include all descriptions.
SS-ESMT**	WHITE	Public utility easements
*ABANDONED	YELLOW	All abandoned lines (size & type will Be under SS-TEXT layer, if we have it)

*Layers for internal city use only

** Linetype should be Hidden2

Sewer Pipe types (size of pipe will precede type abbreviation):

DI = Ductile Iron CY = Clay DR = Dripscope PVC = pvc pipe
AC = Asbestos Cement RCP = Reinforced Concrete Pipe HDPE = High Density Polyethylene Pipe

Additional Information:

Linetype = continuous; Lineweight = default

Any additional abbreviated layers will be accompanied by description

APPENDIX B - Approved Materials List

DESCRIPTION	MAKE AND MODEL	DOMESTIC SOURCE	REFERENCE	REQUIRED	OR EQUIVALENT (submittals required)
PVC Pipe	SDR 35(46PS)		ASTM D3034(4"-15") ASTM F-679(18"-36") ASTM D3212		X
HDPE Pipe	DR 21		ASTM D3350		X
Ductile Iron for Pressure Sewers- Protector 401	Griffin Pipe Co. or U.S. Pipe & Foundry Co. or American Ductile		AWWA Class 52 ASTM A716/A746	X	
Concrete Pipe, non-reinforced (<10")	see WSDOT QPL		ASTM C14, Class 2		X
Concrete Pipe, reinforced (>13")	see WSDOT QPL		ASTM C76		X
Precast Concrete Sewer Manhole	see WSDOT QPL		S-01, S-02, S-03		X
Clean Out Ring & Cover	EJIW 3671APT (H145D for 4"X8")		S-07		X
Side Sewer Saddle	Romac Style CB		S-08		X
Manhole Assembly Locking	East Jordan: Lid#3705APTDI Frame # 3715ZPT		G-11		X
Ladders and Steps	Lane #p-13938; MA #PS2-PF		Sewer, Storm	X	
Casing Spacers	APS #SSI & SI, Uniflange #UFRCS 1300		Water & Sewer		X

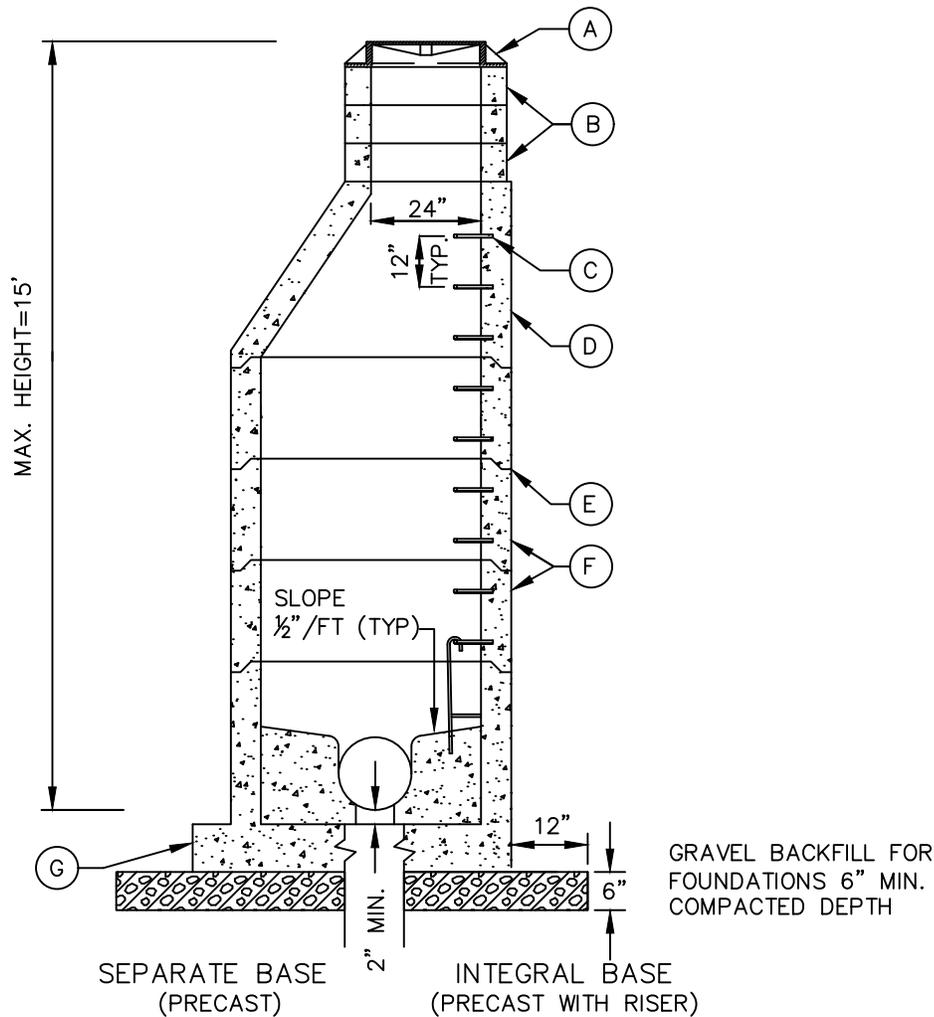
DESCRIPTION	MAKE AND MODEL	DOMESTIC SOURCE	REFERENCE	REQUIRED	OR EQUIVALENT (submittals required)
Casing End Seals	APS AC End Seal		Water & Sewer	X	
Locate Wire	Copper Clad Steel (CCS) 10 AWG, HDPE or HMWPE, colored jacket		Water, Sewer, Storm, Fiberoptic		X
Ladder Post	Bilco-Ladder Up Post, LU-4		Sewer, Water, Storm, Street	X	
Waterproof Manhole Insert	Southwestern Packing and Seals, Inc.- (Rain Stopper)				X
Pre-Manufactured Concrete Vaults	See WSDOT QPL				X
Single or Double Leaf Full Open Vault Access Door (non-slip coating when located where pedestrians will be present)	LW Products (HHS or HHD rated when subject to traffic)	X		X	
Valve Box Top	EJ85557016U	X		X	
Valve Box Cover	EJ06800030	X		X	
Valve Box Base	EJ85556024U	X		X	
Non-Shrink Grout/Mortar			Conforms to WSDOT Spec. 9-20.4(3)		
Padlocks	Best w/ Interchangeable Construction Core			X	
Controlled Density Fill (CDF)	Cadman Pro Flow 5hr 110021 Dry Pac		S-05		X

DESCRIPTION	MAKE AND MODEL	DOMESTIC SOURCE	REFERENCE	REQUIRED	OR EQUIVALENT (submittals required)
Epoxy lining system	Raven 404, Neopoxy				X
Valve Access Box – Outside of traffic areas	Carson 1419-14B with 1419-2B Cover		S-18		X
Valve Access Box – subject to traffic	Fogtite B9-1/2		S-18		X
Removable steel bollard	Traffic Guard RPL4		G-04	X	
Fixed steel bollard	Traffic Guard Embedded RFP		G-04	X	

APPENDIX C - Sewer Standard Details Index

(NOTE: ANY CONFLICTS OR INCONSISTENCIES BETWEEN THESE DETAILS AND THE GENERAL PROVISIONS OR TECHNICAL SPECIFICATIONS, THE DETAILS SHALL TAKE PRECEDENCE.)

DESCRIPTION	DETAIL NO.
<u>SEWER</u>	
SEWER MH TYPE 1	S-01
SEWER MH TYPE 2	S-02
SEWER MH TYPE 3	S-03
SEWER MH UNDER 5 FT DEEP	S-04
OUTSIDE DROP STRUCTURE	S-05
INSIDE DROP STRUCTURE	S-06
SEWER CLEANOUT	S-07
SIDE SEWER STUB	S-08
SIDE SEWER CONNECTION	S-09
CVA FOR SIDE SEWER	S-10
SAMPLING TEE	S-11
GREASE INTERCEPTOR GENERAL LAYOUT	S-12
VEHICLE SERVICE DRAINAGE	S-13
NEW MH ON EXISTING SEWER	S-14
MH PLATFORM	S-15
MH GREATER THAN 15FT DEEP	S-16
PRIVATE FORCE MAIN CONNECTION TO MH	S-17
PRIVATE GRINDER PUMP SYSTEM	S-18
SINGLE FAMILY GRINDER PUMP	S-19



LEGEND

- A. FRAME & COVER – SEE STANDARD DETAIL G-11 (CIRCULAR FRAME & COVER, BOLT-LOCKING).
- B. ADJUSTMENT SECTION – SEE STANDARD DETAIL G-09 (MH OR CB RING ADJUSTMENT DETAIL).
- C. STEPS & LADDER – SEE STANDARD DETAIL G-12 (MH LADDER & STEP)
- D. PRECAST CONE (CONCENTRIC)
- E. RUBBER GASKET BETWEEN ALL PRECAST SECTIONS. USE BITUTHENE 4000 FOR WATERPROOFING WHEN THE POTENTIAL FOR GROUNDWATER EXISTS.
- F. PRECAST RISER SECTIONS (TYP)
- G. PRECAST BASE: INTEGRAL BASE AND RISER, OR SEPARATE BASE

NOTES

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M198 AND M199, UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. PRECAST BASES SHALL BE FURNISHED WITH KOR-N-SEAL CONNECTOR, UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
3. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT IN ANY POSITION.
4. SEE WSDOT STANDARD SPECIFICATIONS SEC. 7-05.3 AND 9-20.4(3).
5. ADJUSTMENT RISERS AND FRAME SHALL BE SET IN 3/4" NON-SHRINK GROUT. FILL LIFTING HOLES INSIDE AND OUT. PLASTER SMOOTH INSIDE AND OUT.
6. MINIMUM 2% SLOPE ON CHANNEL.
7. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER, AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.
8. ALL MANHOLES SHALL BE LOCATED OUTSIDE THE WHEEL PATH WHERE FEASIBLE AND NOT IN A BIKE LANE.

SEWER MANHOLE TYPE 1

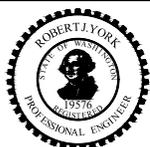
48", 54", 60"

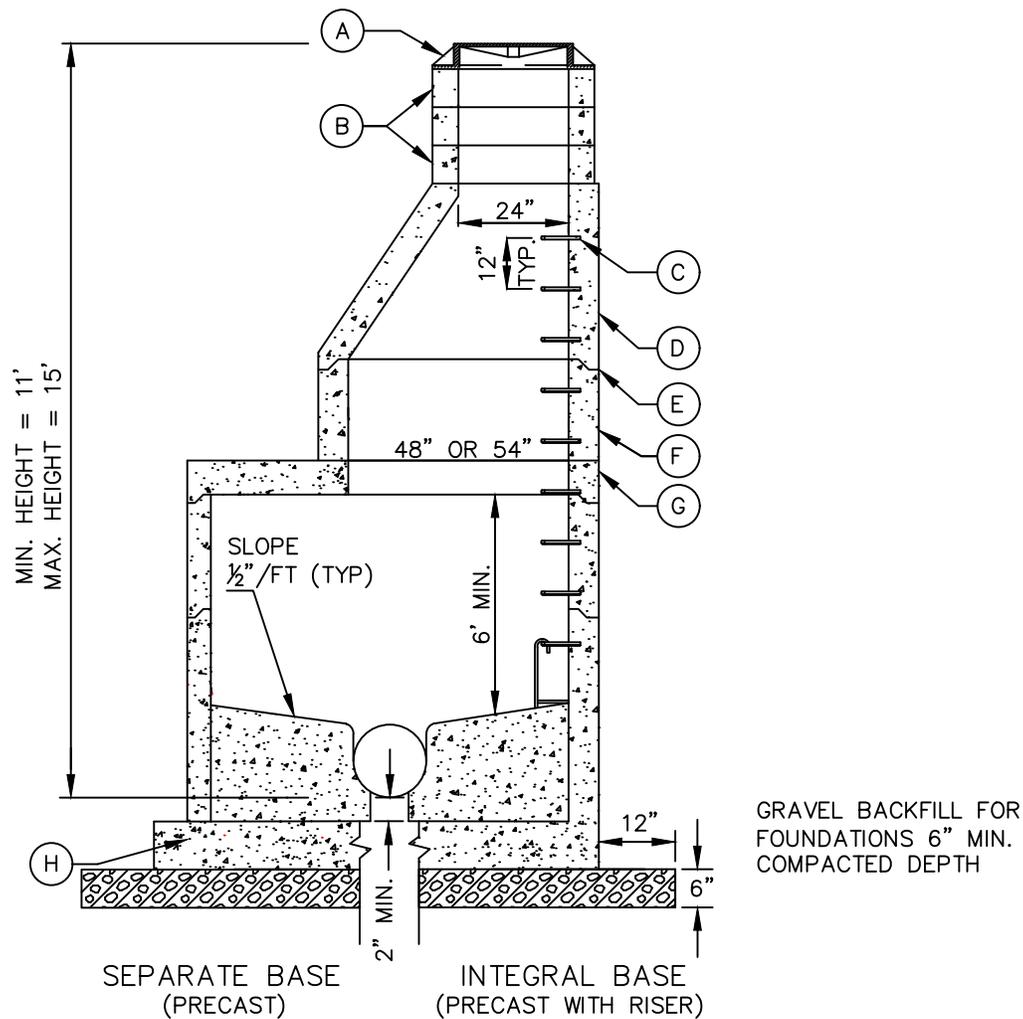
DATE: 2/01/2021

SCALE: NTS

STANDARD
DETAIL NO.

S-01





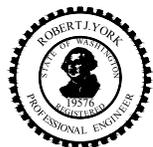
GRAVEL BACKFILL FOR FOUNDATIONS 6" MIN. COMPACTED DEPTH

LEGEND

- A. FRAME & COVER – SEE STANDARD DETAIL G-11 (CIRCULAR FRAME & COVER, BOLT-LOCKING).
- B. ADJUSTMENT SECTION – SEE STANDARD DETAIL G-09 (MH OR CB RING ADJUSTMENT DETAIL).
- C. STEPS & LADDER – SEE STANDARD DETAIL G-12 (MH LADDER & STEP)
- D. PRECAST CONE (CONCENTRIC)
- E. RUBBER GASKET BETWEEN ALL PRECAST SECTIONS. USE BITUTHENE 4000 FOR WATERPROOFING WHEN THE POTENTIAL FOR GROUNDWATER EXISTS.
- F. PRECAST RISER SECTIONS (TYP)
- G. PRECAST BASE: INTEGRAL BASE AND RISER, OR SEPARATE BASE

NOTES

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M198 AND M199, UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. PRECAST BASES SHALL BE FURNISHED WITH KOR-N-SEAL CONNECTOR, UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
3. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT IN ANY POSITION.
4. SEE WSDOT STANDARD SPECIFICATIONS SEC. 7-05.3 AND 9-20.4(3).
5. ADJUSTMENT RISERS AND FRAME SHALL BE SET IN 3/4" NON-SHRINK GROUT. FILL LIFTING HOLES INSIDE AND OUT. PLASTER SMOOTH INSIDE AND OUT.
6. MINIMUM 2% SLOPE ON CHANNEL.
7. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER, AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.
8. ALL MANHOLES SHALL BE LOCATED OUTSIDE THE WHEEL PATH WHERE FEASIBLE AND NOT IN A BIKE LANE.



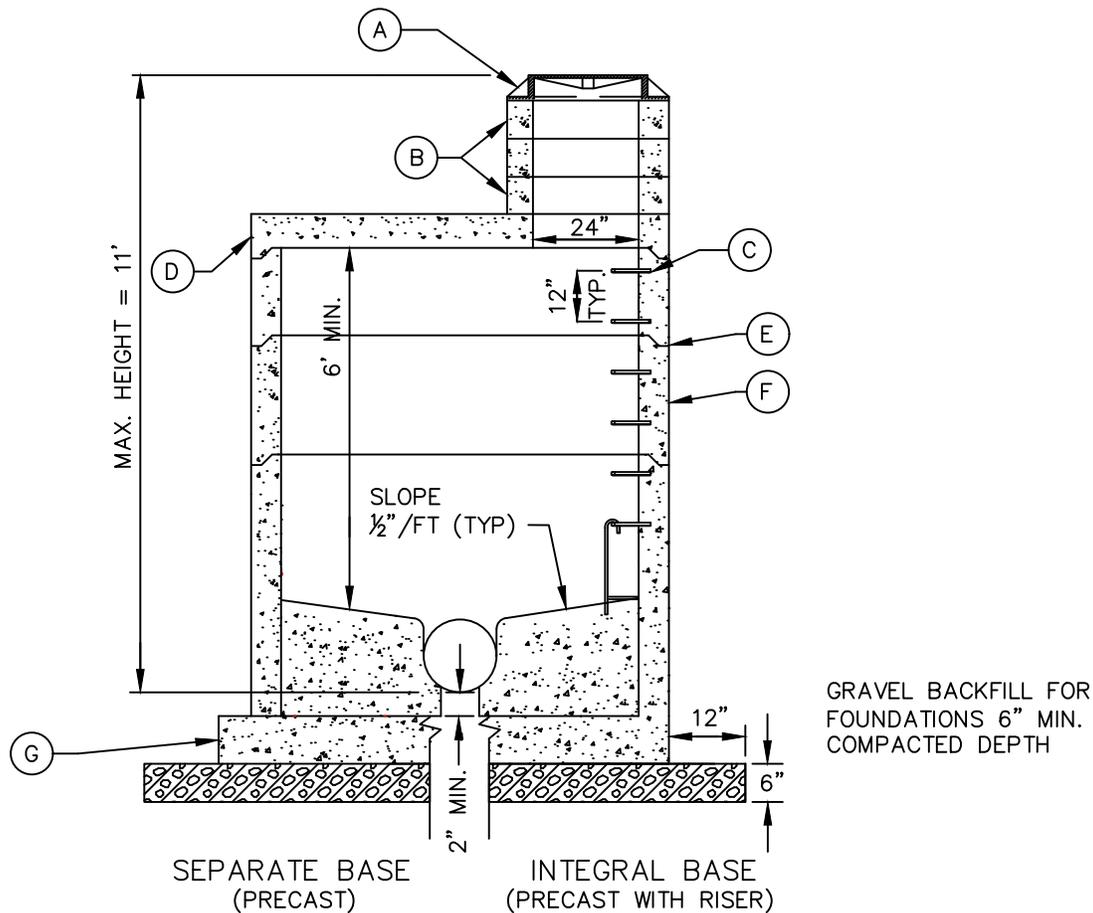
SEWER MANHOLE TYPE 2
72" & 96"

DATE: 2/01/2021

SCALE: NTS

STANDARD
DETAIL NO.

S-02



LEGEND

- A. FRAME & COVER – SEE STANDARD DETAIL G-11 (CIRCULAR FRAME & COVER, BOLT-LOCKING).
- B. ADJUSTMENT SECTION – SEE STANDARD DETAIL G-09 (MH OR CB RING ADJUSTMENT DETAIL).
- C. STEPS & LADDER – SEE STANDARD DETAIL G-12 (MH LADDER & STEP)
- D. PRECAST CONE (CONCENTRIC)
- E. RUBBER GASKET BETWEEN ALL PRECAST SECTIONS. USE BITUTHENE 4000 FOR WATERPROOFING WHEN THE POTENTIAL FOR GROUNDWATER EXISTS.
- F. PRECAST RISER SECTIONS (TYP)
- G. PRECAST BASE: INTEGRAL BASE AND RISER, OR SEPARATE BASE

NOTES

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M198 AND M199, UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. PRECAST BASES SHALL BE FURNISHED WITH KOR-N-SEAL CONNECTOR, UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
3. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT IN ANY POSITION.
4. SEE WSDOT STANDARD SPECIFICATIONS SEC. 7-05.3 AND 9-20.4(3).
5. ADJUSTMENT RISERS AND FRAME SHALL BE SET IN 3/4" NON-SHRINK GROUT. FILL LIFTING HOLES INSIDE AND OUT. PLASTER SMOOTH INSIDE AND OUT.
6. MINIMUM 2% SLOPE ON CHANNEL.
7. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER, AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.
8. ALL MANHOLES SHALL BE LOCATED OUTSIDE THE WHEEL PATH WHERE FEASIBLE AND NOT IN A BIKE LANE.

SEWER MANHOLE TYPE 3

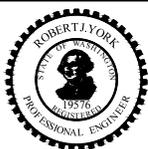
72" & 96"

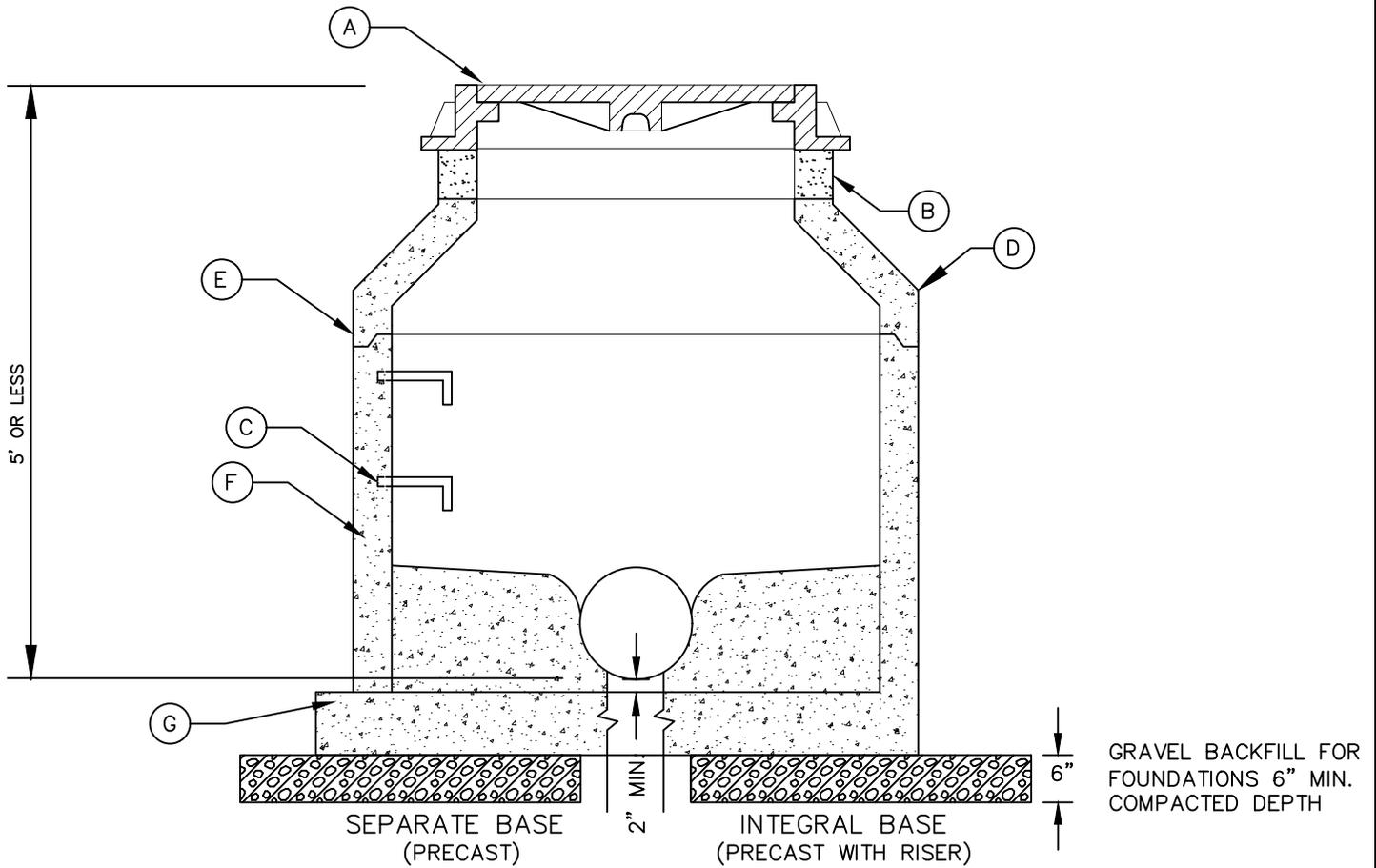
DATE: 2/01/2021

STANDARD
DETAIL NO.

SCALE: NTS

S-03





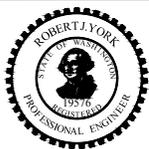
GRAVEL BACKFILL FOR FOUNDATIONS 6" MIN. COMPACTED DEPTH

LEGEND

- A. FRAME & COVER – SEE STANDARD DETAIL G-11 (CIRCULAR FRAME & COVER, BOLT-LOCKING).
- B. ADJUSTMENT SECTION – SEE STANDARD DETAIL G-09 (MH OR CB RING ADJUSTMENT DETAIL).
- C. STEPS & LADDER – SEE STANDARD DETAIL G-12 (MH LADDER & STEP)
- D. PRECAST CONE (CONCENTRIC)
- E. RUBBER GASKET BETWEEN ALL PRECAST SECTIONS. USE BITUTHENE 4000 FOR WATERPROOFING WHEN THE POTENTIAL FOR GROUNDWATER EXISTS.
- F. PRECAST RISER SECTIONS (TYP)
- G. PRECAST BASE: INTEGRAL BASE AND RISER, OR SEPARATE BASE

NOTES

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M198 AND M199, UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. PRECAST BASES SHALL BE FURNISHED WITH KOR-N-SEAL CONNECTOR, UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
3. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT IN ANY POSITION.
4. SEE WSDOT STANDARD SPECIFICATIONS SEC. 7-05.3 AND 9-20.4(3).
5. ADJUSTMENT RISERS AND FRAME SHALL BE SET IN 3/4" NON-SHRINK GROUT. FILL LIFTING HOLES INSIDE AND OUT. PLASTER SMOOTH INSIDE AND OUT.
6. MINIMUM 2% SLOPE ON CHANNEL.
7. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER, AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.
8. ALL MANHOLES SHALL BE LOCATED OUTSIDE THE WHEEL PATH WHERE FEASIBLE AND NOT IN A BIKE LANE.



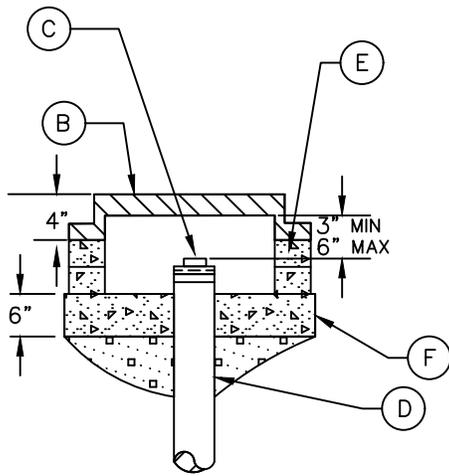
**SEWER MANHOLE
UNDER 5 FEET DEEP**

DATE: 2/01/2021

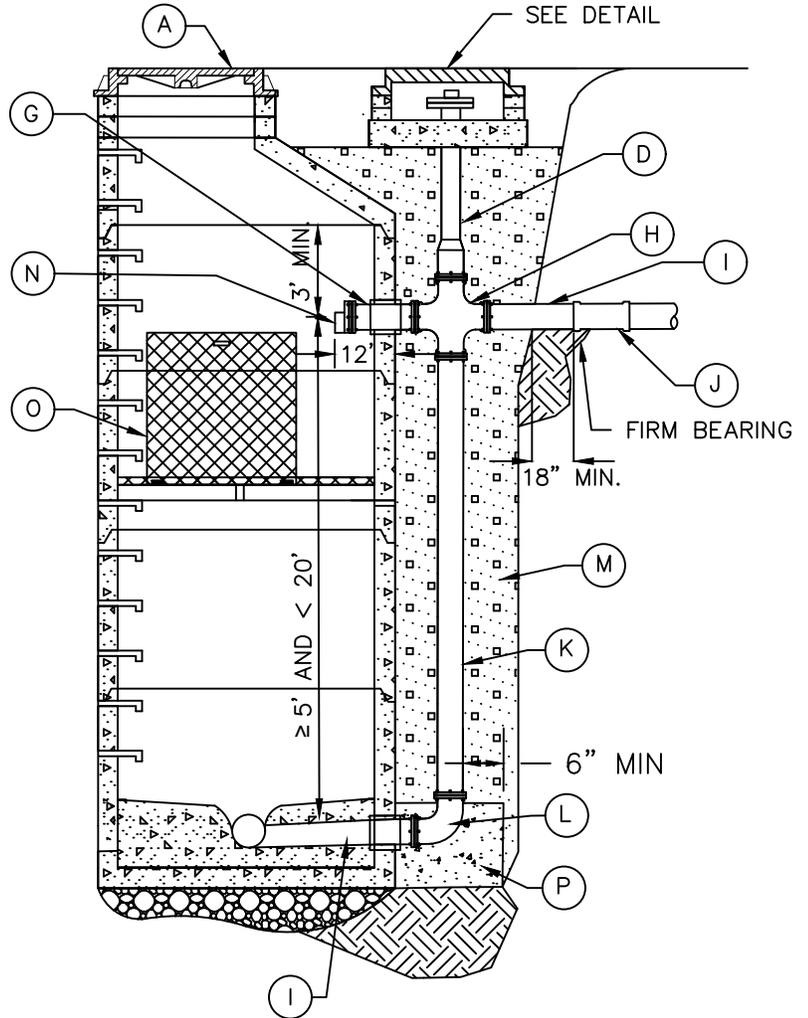
SCALE: NTS

STANDARD
DETAIL NO.

S-04

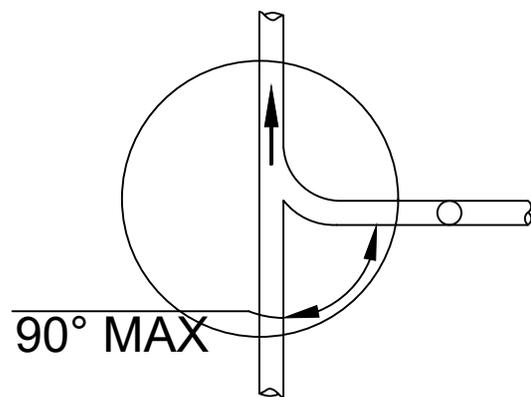


DETAIL
SEE S-07



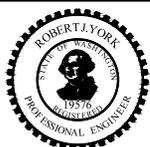
LEGEND

- A. SEWER MH TYPE 1. SEE STANDARD DETAIL S-01 (SEWER MH TYPE 1 48",54",60").
- B. RING AND CLEANOUT COVER. SEE APPROVED MATERIALS LIST
- C. C900 PVC CAP WITH GASKET AND HANDLE
- D. C900 PVC PIPE-6" WITH TRANSITION.
- E. TWO 4" CONCRETE RINGS
- F. CONCRETE COLLAR
- G. KOR-N-SEAL AND GROUT (TYP).
- H. CROSS, MJ
- I. AWWA C900 PVC, DR 18 NIPPLE
- J. TRANSITION COUPLING
- K. PE x PE AWWA C900 PVC DR 18 - 1 PIECE OF PVC PIPE FROM CROSS TO BEND
- L. 90° BEND, AWWA C907 PVC, MJxMJ OR MJxPE
- M. CONTROLLED DENSITY FILL EQUAL TO CADMAN PROFLOW 5 HOUR 11021
- N. AWWA C907 MJ CAP WITH GASKET. TOP 1/3 OF CAP FACE SHALL BE CUT OFF.
- O. MANHOLE PLATFORM. SEE STANDARD DETAIL S-15.
- P. CONCRETE CL 3000 BLOCK POURED IN PLACE.



NOTES

1. OUTSIDE DROP CAN BE USED FOR NEW CONSTRUCTION WHERE APPROVED BY THE CITY.
2. CORE DRILL OPENINGS FOR NEW PIPE.
3. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER, AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.



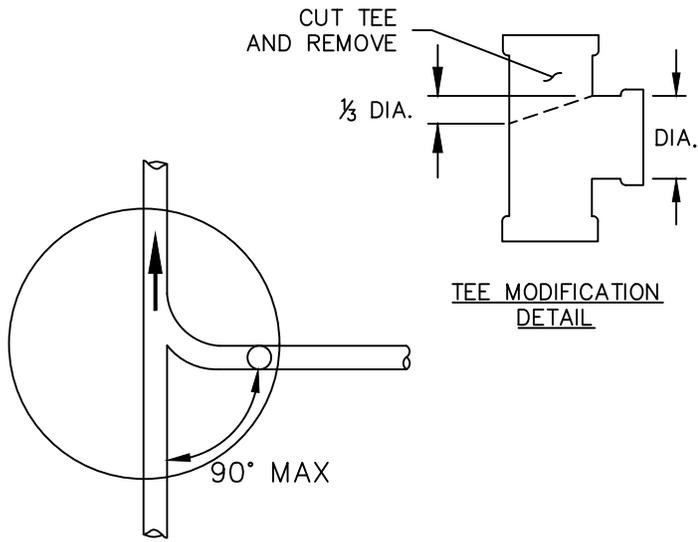
OUTSIDE DROP STRUCTURE

DATE: 2/01/2021

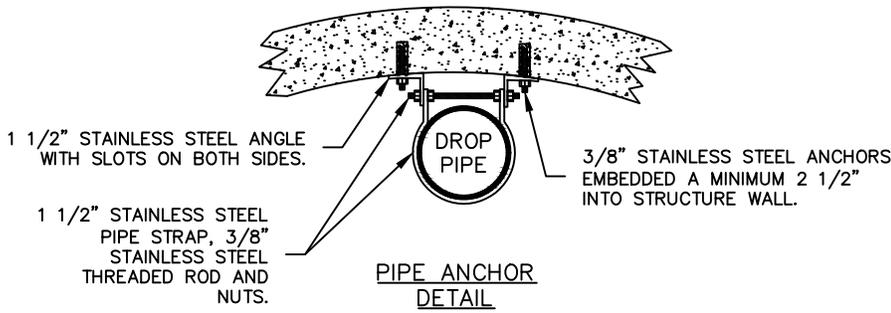
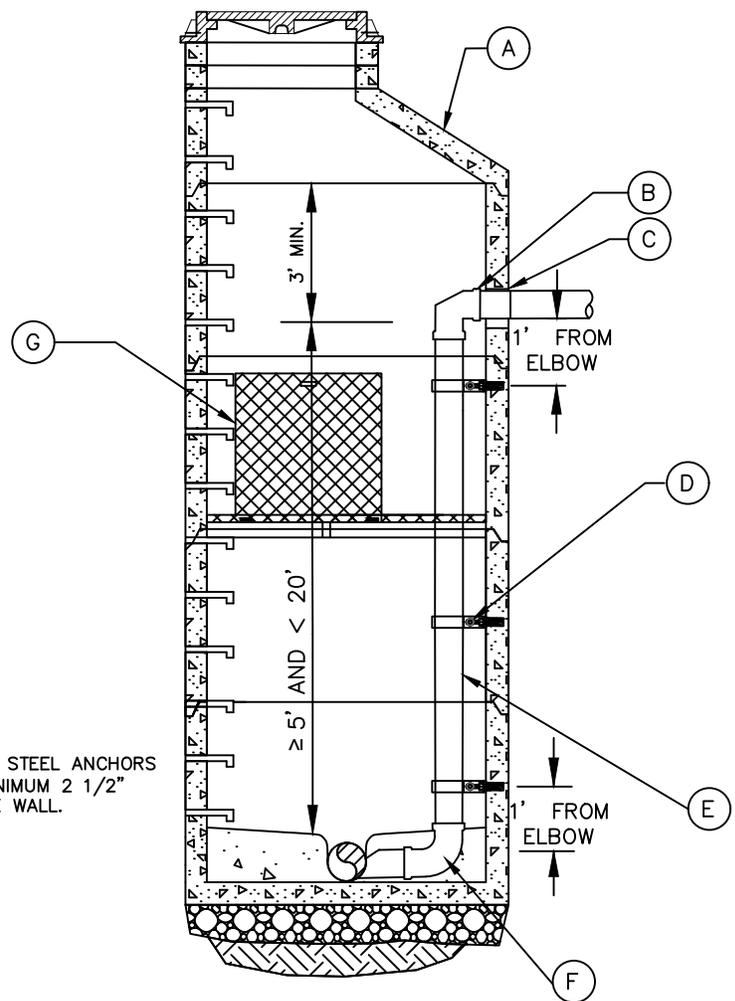
SCALE: NTS

STANDARD
DETAIL NO.

S-05



PLAN VIEW



PIPE ANCHOR DETAIL

LEGEND

- A. SEWER MH TYPE 1— SEE STANDARD DETAIL S-01 (SEWER MH TYPE I 48", 54", 60").
- B. TEE, PVC SDR35 GASKETED JOINTS, MODIFIED, SEE DETAIL
- C. KOR-N-SEAL CONNECTOR
- D. 1 1/2" STAINLESS STEEL PIPE STRAP, 3/8" THREADED STAINLESS STEEL ROD AND NUTS. 3/8" STAINLESS STEEL ANCHORS EMBEDDED A MINIMUM OF 2 1/2" IN STRUCTURE WALL. TOP & BOTTOM ANCHORS SPACED 1FT FROM TEE/ELBOW. MAXIMUM 5FT ON CENTER WITH A MINIMUM OF 3 ANCHORS OVER 5FT. SEE DETAIL.
- E. PVC ASTM D3034 SDR35 — 1 PIECE PVC FROM THE TEE TO BEND
- F. 90° BEND, PVC SDR35 GASKETED JOINT. ENCASE IN CL 3000 CONCRETE.
- G. MANHOLE PLATFORM SEE STANDARD DETAIL S-15 (MANHOLE PLATFORM).

NOTES

1. INSIDE DROP SHALL BE INSTALLED ONLY WHERE APPROVED BY CITY. INSIDE DROP IS ONLY ALLOWED ON EXISTING MANHOLES.
2. MULTIPLE DROPS SHALL BE REVIEWED AND APPROVED BY THE CITY.
3. CORE DRILL OPENINGS FOR NEW PIPE.
4. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER, AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.



INSIDE DROP STRUCTURE

DATE: 2/01/2021

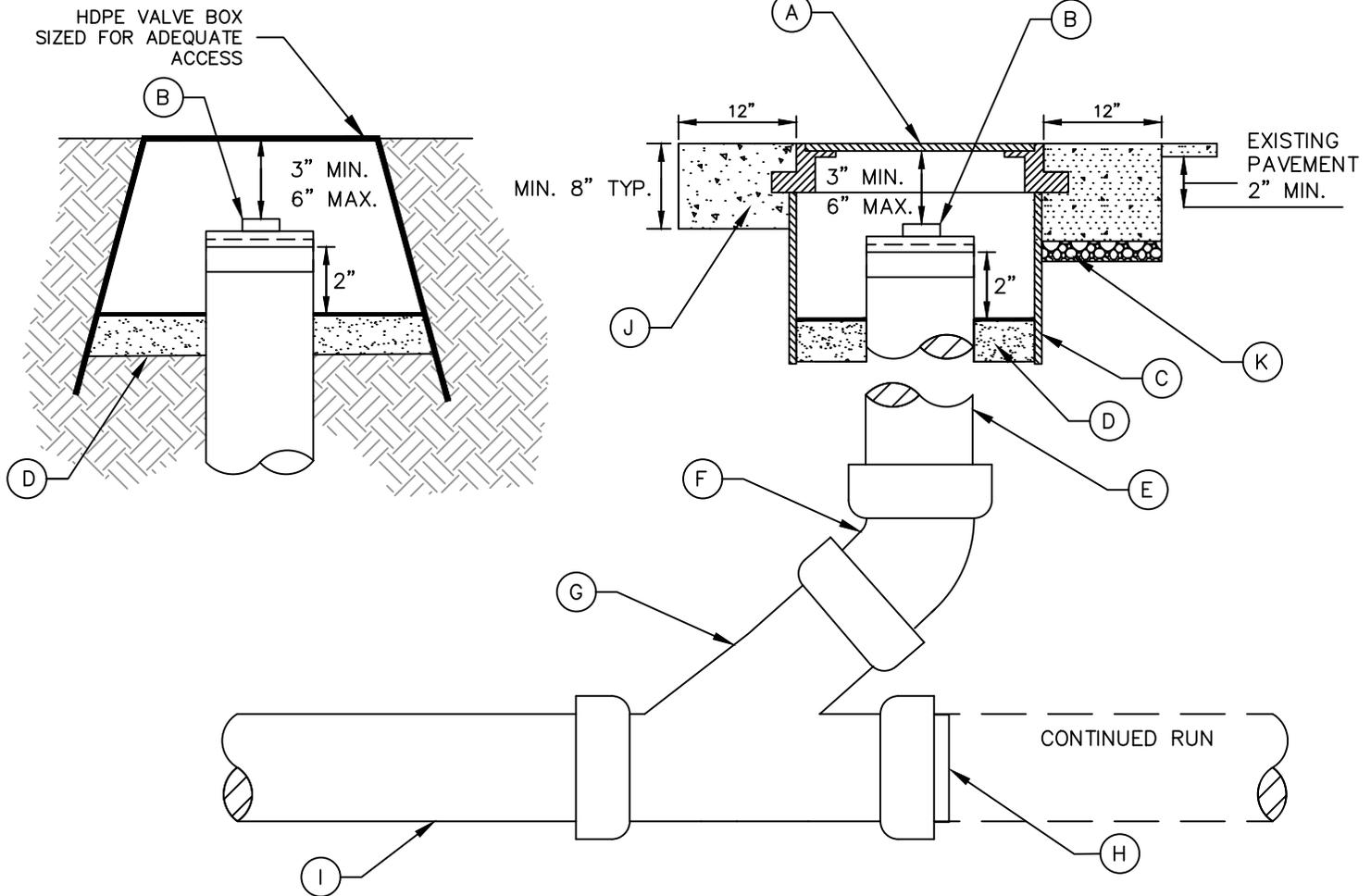
SCALE: NTS

STANDARD DETAIL NO.

S-06

LANDSCAPED AREAS

PAVED AREAS



LEGEND

- A. CLEANOUT RING AND COVER. SEE APPROVED MATERIALS LIST.
- B. 4" x 4" OR 4" x 6" BUSHING WITH THREADED 4" PLUG WITH 2" SQUARE NUT ON PLUG.
- C. PVC PIPE, 12"-16" DIA., MIN. 12" LONG.
- D. SAND OR CRUSHED SURFACING TOP COURSE MATERIAL COVERED IN FILTER FABRIC.
- E. RISER
- F. 45° BEND
- G. WYE WITH CONTINUED RUN OR 45° BEND.
- H. WATERTIGHT PLUG OR CONTINUED PVC RUN.
- I. 4" OR 6" SEWER PIPE
- J. 8" MIN. ASPHALT OR 3000 PSI CEMENT CONCRETE COLLAR
- K. PLACE & COMPACT CRUSHED SURFACING TOP COURSE

NOTES

1. CLEAN OUT COVER SHALL READ "SSCO" OR "SEWER". SEE APPROVED MATERIALS LIST.
2. RING AND COVER SHALL BE .05"-.10" ABOVE FINISHED GRADE TO PREVENT ENTRY OF SURFACE WATER.
3. ALL SEWER PIPE AND FITTINGS TO BE PVC ASTM D3034 SDR35 WITH RUBBER GASKETED JOINTS.
4. CLEAN OUTS REQUIRED FOR EVERY TWO BENDS EQUALING 135° OR MORE. 100' MAXIMUM BETWEEN CLEAN OUTS.



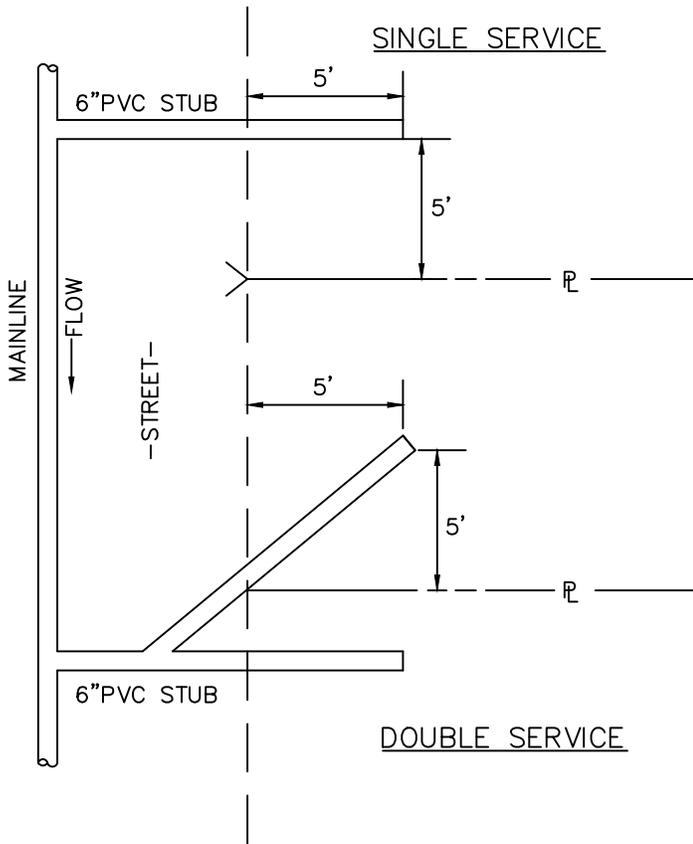
SEWER CLEANOUT

DATE: 2/01/2021

SCALE: NTS

STANDARD
DETAIL NO.

S-07

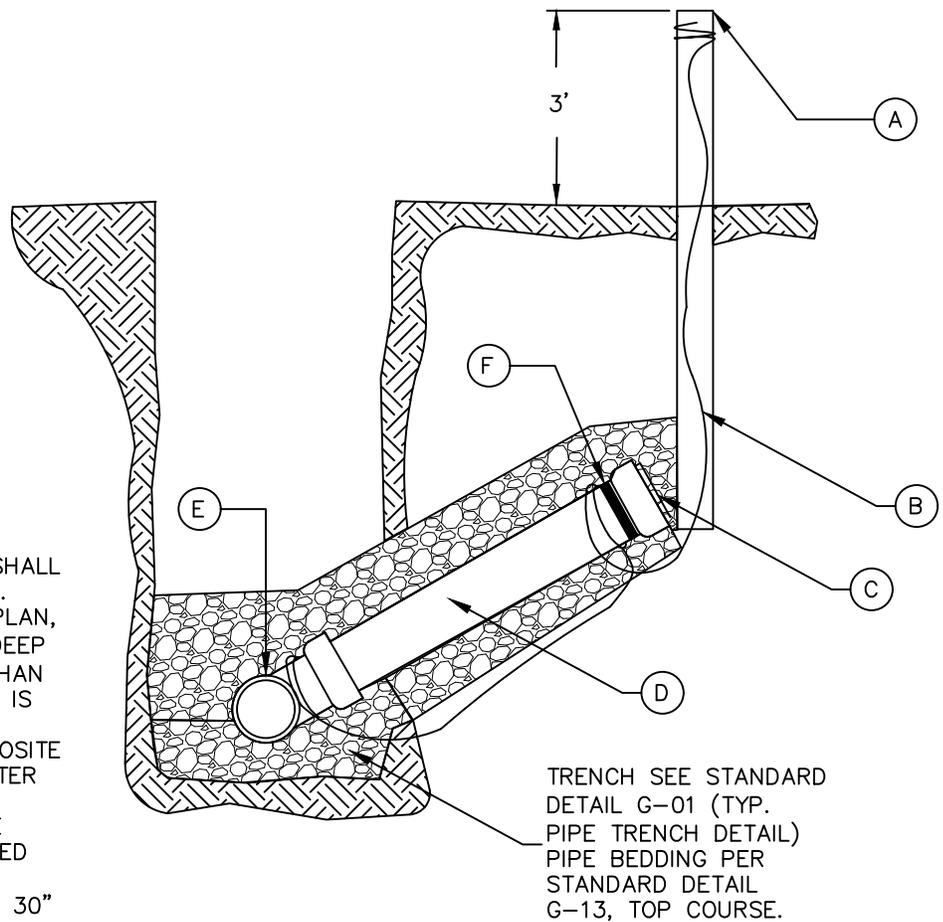


LEGEND

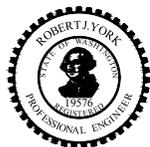
- A. 4" SDR 35, GREEN PIPE, BURIED TO DEPTH OF INVERT. EXTENDED MINIMUM 3' ABOVE GRADE.
- B. LOCATE WIRE TO BE WRAPPED AROUND SEWER MAIN TO END OF MARKER POST. DRILL HOLE FOR LOCATE WIRE 6" FROM TOP OF MARKER POST. LEAVE MINIMUM 3' OF SLACK IN WIRE, INSIDE MARKER POST.
- C. PLUG OR CAP
- D. 6" SDR 35 GASKET, GREEN PIPE, ONE LENGTH MIN., MIN. SLOPE 2%
- E. 6" TEE OUTLET (SIDE)
- F. SEWER TAPE

NOTES

1. WHERE SIDE SEWER CONNECTS TO MANHOLE: INVERT OF SIDE SEWER SHALL BE AT SPRING LINE OF MAIN SEWER.
2. UNLESS OTHERWISE INDICATED ON PLAN, SIDE SEWER SHALL BE MIN. OF 6' DEEP AT PROPERTY LINE, OR 5' LOWER THAN THE LOWEST ELEVATION, WHICHEVER IS LOWER.
3. SEWER STUBS SHALL BE ON OPPOSITE SIDES OF THE LOT FROM THE WATER SERVICE.
4. TAPS ON EXISTING MAINS SHALL BE MADE WITH A SADDLE. SEE APPROVED MATERIALS LIST.
5. MINIMUM COVER UNDER A DITCH IS 30" OR PROVIDE CASING SLEEVE.



TRENCH SEE STANDARD DETAIL G-01 (TYP. PIPE TRENCH DETAIL) PIPE BEDDING PER STANDARD DETAIL G-13, TOP COURSE.



SIDE SEWER STUBS

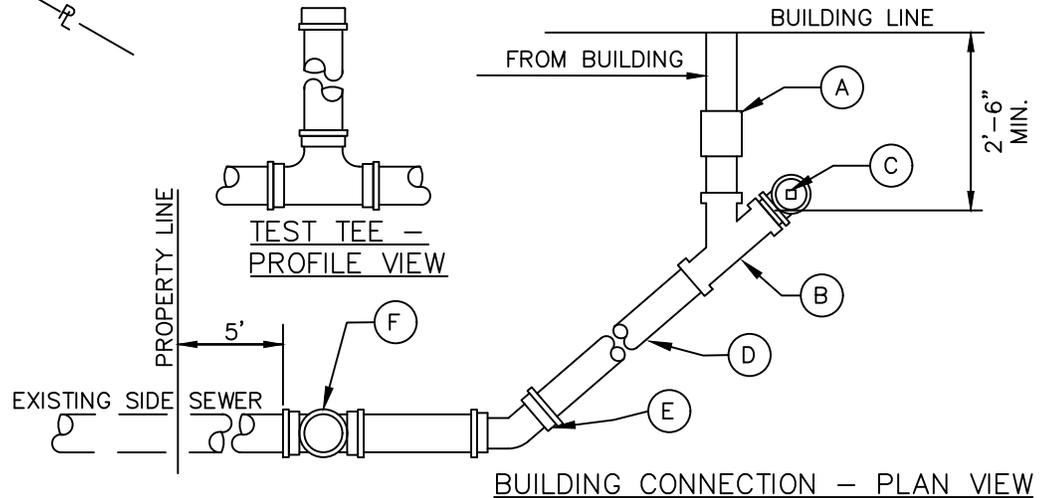
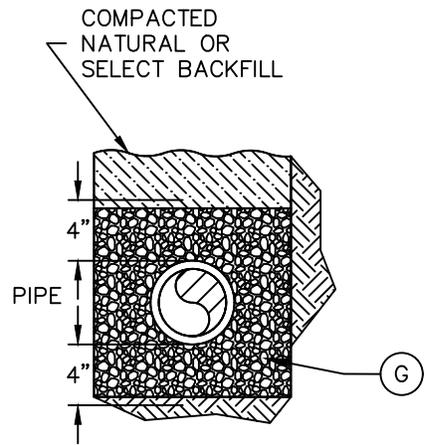
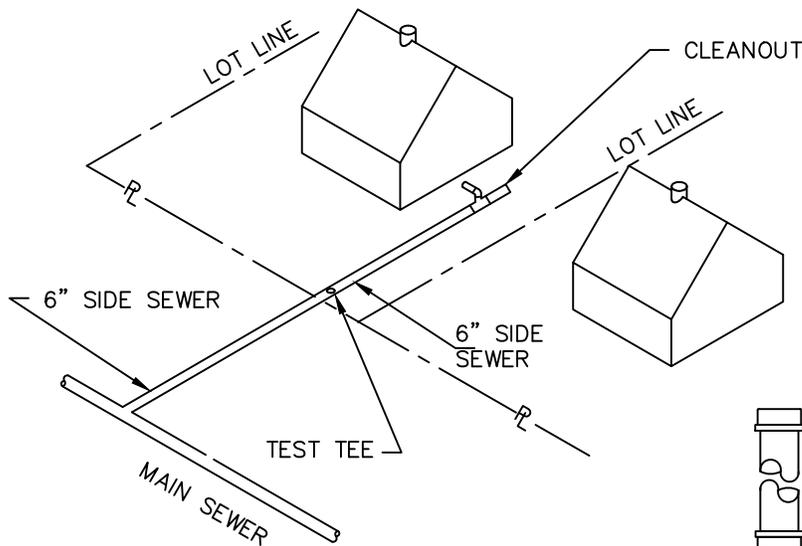
DATE: 2/01/2021

SCALE: NTS

STANDARD DETAIL NO.

S-08

TYPICAL HOUSE CONNECTION

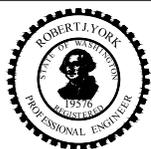


LEGEND

- A. COUPLING. SEE APPROVED MATERIALS LIST.
- B. CLEANOUT WYE, 18" MIN. COVER
- C. CLEANOUT. SEE STANDARD DETAIL S-07 (SEWER CLEANOUT).
- D. 6" PVC SDR35 WITH RUBBER GASKETED JOINTS, LENGTHS AS REQUIRED.
- E. BEND AS REQUIRED. NO 90° BENDS.
- F. 6" TEST TEE. BRANCH FACING UP FOR TEST TEE AND WATER TIGHT PLUG.
- G. PIPE BEDDING, COMPACTED GRAVEL BACKFILL FOR PIPE ZONE BEDDING PER STANDARD DETAIL G-13.

NOTES

1. CLEAN OUTS REQUIRED FOR EVERY 2 BENDS EQUALING 135° OR MORE. SEE STANDARD DETAIL S-07 (SEWER CLEANOUT). 100' MAXIMUM BETWEEN CLEANOUTS.
2. PIPE BELLS LAID UPGRADE.
3. MINIMUM 1% SLOPE FOR 6" PIPE.
4. 18" MINIMUM COVER ON PROPERTY.
5. MAXIMUM 4 RESIDENTIAL UNITS PER 6" SIDE SEWER.
6. CLEAN OUT REQUIRED AT END OF COMMON SIDE SEWER.
7. MINIMUM 10' SEPARATION (HORZ.) BETWEEN WATER AND SEWER LINES.
8. RECORD DRAWINGS REQUIRED AT TIME OF INSPECTION.
9. WATER-SEWER CROSSINGS- SHALL COMPLY WITH WASHINGTON STATE DEPARTMENT OF ECOLOGY REQUIREMENTS.
10. CHECK VALVE REQUIRED ON SIDE SEWERS WHEN LOWEST SERVICE ELEVATION IS 2' OR LESS ABOVE THE HYDRAULIC GRADE LINE. SEE STANDARD DETAIL S-10 (CHECK VALVE ASSEMBLY).
11. FITTINGS SHALL NOT BE BACKFILLED UNTIL INSPECTED BY THE CITY.
12. IF SIDE SEWER STUB IS NOT AVAILABLE, THE OWNER IS RESPONSIBLE FOR ITS INSTALLATION.
13. TRENCH RESTORATION IN THE R.O.W. SHALL CONFORM TO STANDARD DETAIL G-01 (TYPICAL PIPE TRENCH).
14. PIPE SHALL BE PVC ASTM D3034 SDR35 WITH RUBBER GASKETED JOINTS. SEE APPROVED MATERIALS LIST.



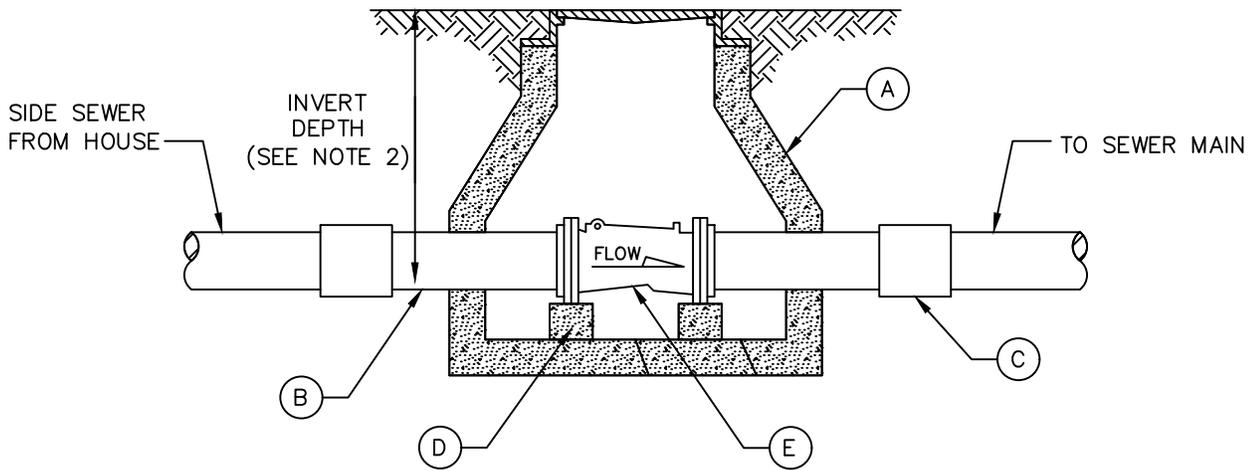
SIDE SEWER CONNECTION

DATE: 2/01/2021

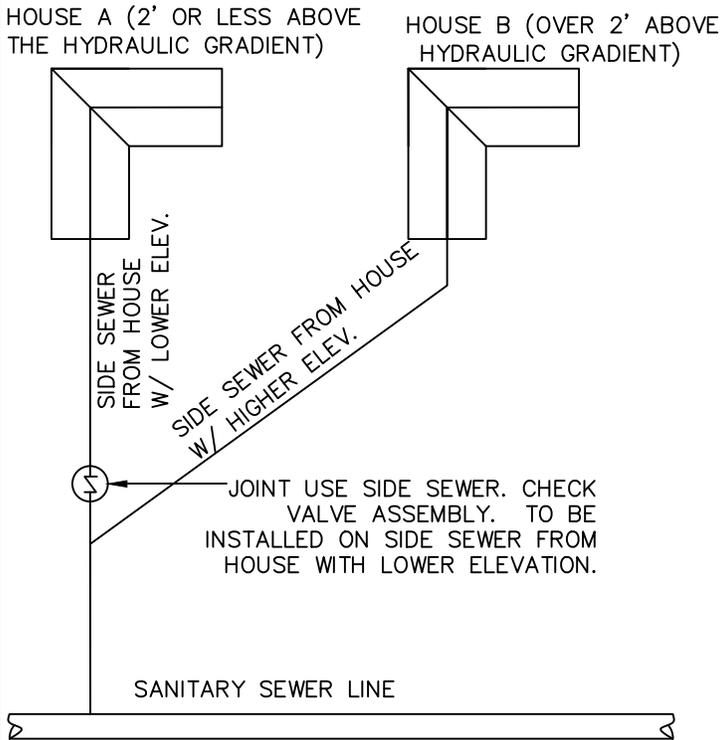
SCALE: NTS

STANDARD
DETAIL NO.

S-09



CHECK VALVE ASSEMBLY DETAIL



CHECK VALVE ASSEMBLY INSTALLATION

LEGEND

- A. METER BOX OR MANHOLE. SEE APPROVED MATERIALS LIST.
- B. 3' D.I. NIPPLE P.E. CL 53 CEMENT LINED (TYP.)
- C. COUPLING
- D. CONCRETE BLOCK
- E. CHECK VALVE - SEE APPROVED MATERIALS LIST.

NOTES

1. CHECK VALVE REQUIRED ON SIDE SEWERS WHEN LOWEST SERVICE ELEVATION IS 2' OR LESS ABOVE THE HYDRAULIC GRADE LINE.
2. FOR INVERT DEPTHS OF 3 FT OR LESS AND OUTSIDE OF PAVED AREAS, USE A METER BOX. FOR INVERT DEPTH OVER 3 FT, USE SEWER MANHOLE (SEE STANDARD DETAIL S-01 OR S-04).
3. COVER FOR THE METER BOX SHALL READ "SEWER".
4. CHECK VALVE ASSEMBLY IS PRIVATE AND SHALL BE THE PROPERTY OWNERS RESPONSIBILITY TO MAINTAIN.

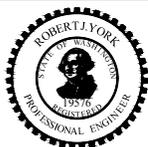
**CHECK VALVE ASSEMBLY
FOR SIDE SEWER**

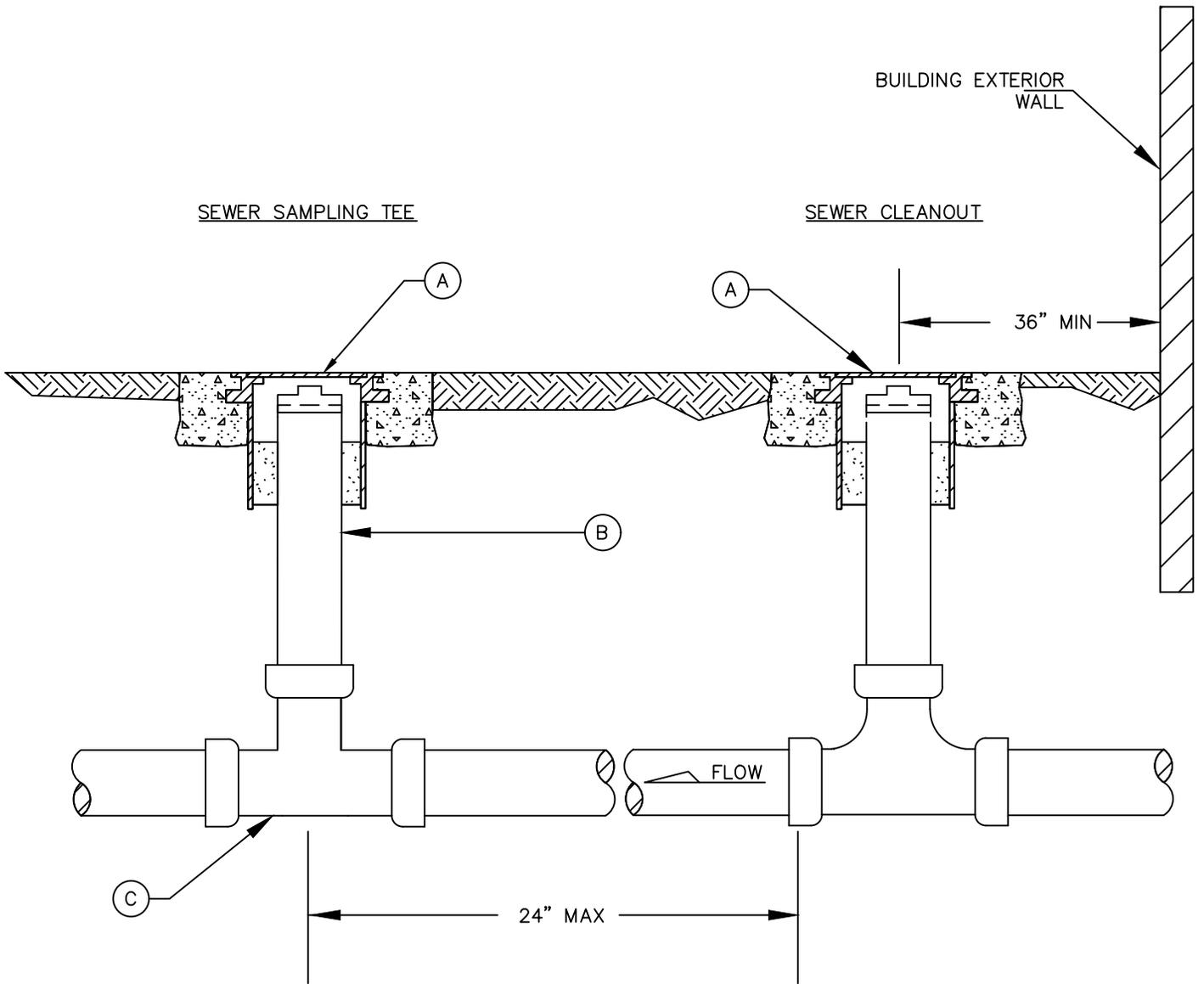
DATE: 2/01/2021

SCALE: NTS

STANDARD
DETAIL NO.

S-10



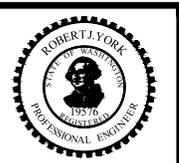


LEGEND

- A. SEWER CLEANOUT- SEE STANDARD DETAIL S-07 (SEWER CLEANOUT).
- B. PVC PIPE (TYP.)
- C. PVC TEE, FACING UP

NOTES

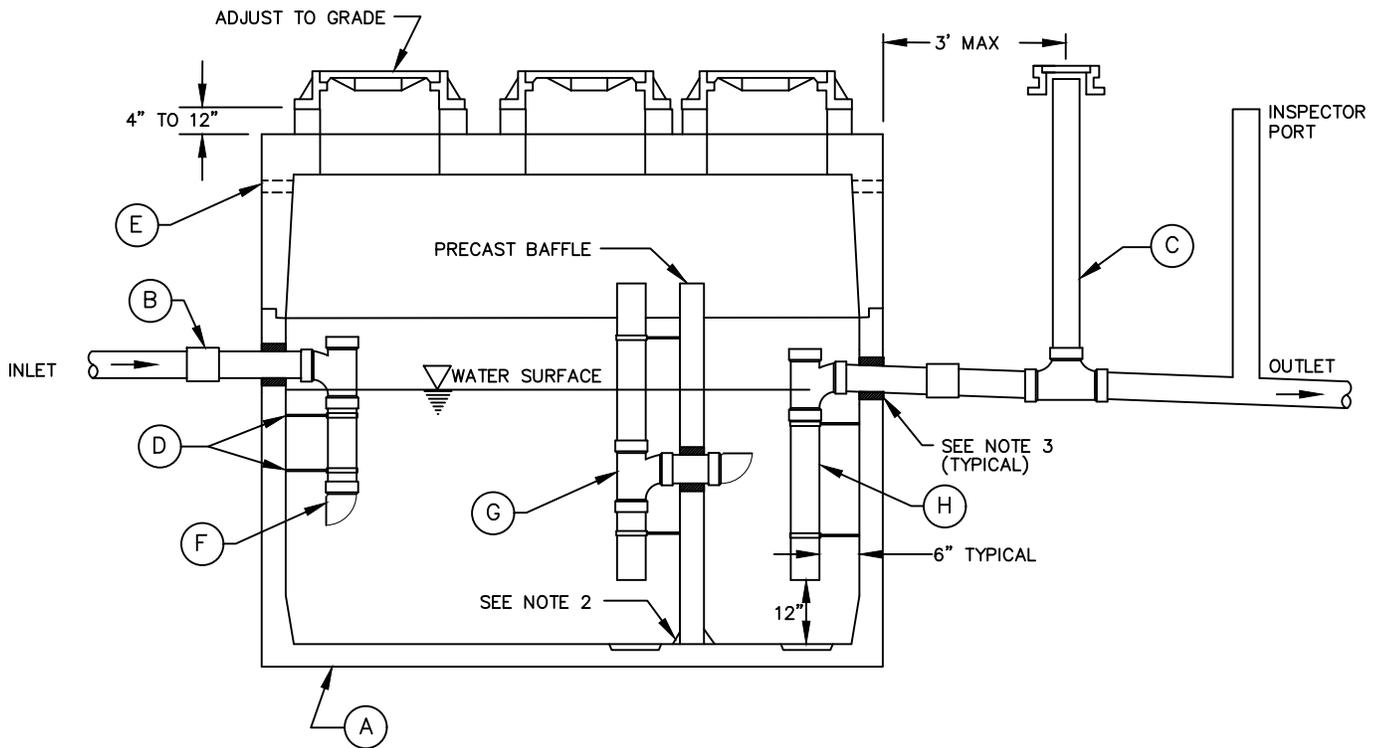
1. RESTAURANT, BAKERY, OR OTHER FAT, OIL, AND GREASE CONTRIBUTOR, WITHOUT AN EXTERIOR GREASE INTERCEPTOR.
2. ALL SEWER PIPE AND FITTINGS TO BE PVC ASTM D3034 SDR35 WITH RUBBER GASKETED JOINTS, SIZED TO MATCH LATERAL.



SAMPLING TEE

DATE: **2/01/2021**
SCALE: **NTS**

STANDARD
DETAIL NO.
S-11



LEGEND

- A. PRECAST CONCRETE VAULT, OLDCASTLE 612 or 816 GGI SERIES (WITH BAFFLE, SUMPS, AND 30" BOLT DOWN, GASKETED CASTINGS), OR EQUAL.
- B. FLEXIBLE COUPLING (TYP)
- C. SAMPLING/CLEAN OUT TEE, USE DOUBLE SWEEP TEE. SEE STANDARD DETAIL S-11 (SAMPLING TEE).
- D. STAINLESS STEEL STRAP AND ANCHOR BOLT (5/8")(TYP)
- E. VENT, TO OPEN ATMOSPHERE PER UBC.
- F. INLET PIPE WITH 2" HOLES IN VERTICAL PIPE, AND CUT ELBOW.
- G. TRANSFER PIPE (2), WITH TEE AND CUT ELBOW.
- H. OUTLET PIPE WITH TEE.

NOTES

- 1. GREASE INTERCEPTOR FOR GRAY-WATER ONLY. BLACK-WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER. GREASE INTERCEPTOR SHALL BE SIZED PER THE UNIFORM PLUMBING CODE AND DESIGNED BY MECHANICAL ENGINEER TO COMPLY WITH ISSAQUAH MUNICIPAL CODE.
- 2. SEAL BAFFLE WALL PER MANUFACTURE RECOMMENDATIONS.
- 3. PRECAST VAULT AND BAFFLE SHALL HAVE KNOCKOUTS OR CORE DRILLED AT ALL PIPE OPENINGS. PENETRATIONS USE KOR-N-SEAL/SAND COLLAR WITH NON-SHRINK GROUT.
- 4. POSITION RISERS BELOW ACCESS OPENINGS TO ALLOW CLEAR ACCESS TO RISER AND VAULT CHAMBER.
- 5. ALL RINGS AND COVERS SHALL BE BOLT DOWN TYPE WITH GASKET, RATED FOR H2O LOADING IN TRAVEL AREAS MINIMUM.
- 6. LOCATE INTERCEPTOR WITHIN 20' OF DRIVE FOR ACCESS BY MAINTENANCE VEHICLE.
- 7. LINE-SIZED P.V.C. PIPE SHALL BE USED THROUGHOUT.
- 8. PRIOR TO STARTUP, GREASE INTERCEPTOR SHALL PASS LEAK TEST WHERE ONLY A MAXIMUM OF 1% DEAD STORAGE REDUCTION IS ALLOWED WITHIN A 24 HOUR PERIOD PER THE UNIFORM PLUMBING CODE 7.12.
- 9. FILL WITH CLEAN WATER PRIOR TO START UP OF SYSTEM.
- 10. MUST BE APPROVED BY IAPMO (UPC) OR NSF.



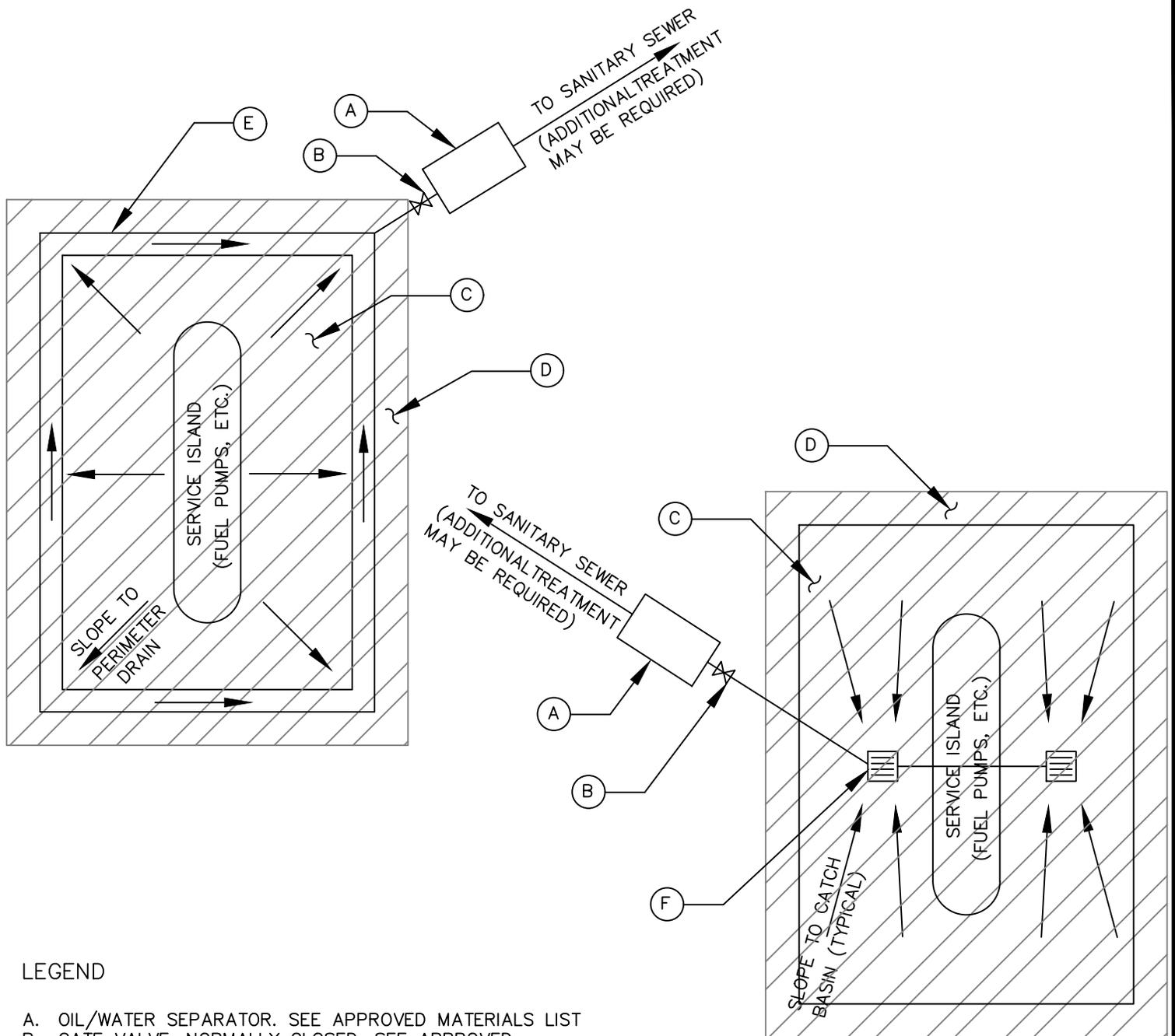
**GREASE INTERCEPTOR
GENERAL LAYOUT**

DATE: 2/01/2021

SCALE: NTS

STANDARD
DETAIL NO.

S-12



LEGEND

- A. OIL/WATER SEPARATOR. SEE APPROVED MATERIALS LIST
- B. GATE VALVE, NORMALLY CLOSED. SEE APPROVED MATERIALS LIST AND G-14 VALVE BOX DETAIL.
- C. CONTAINMENT PAD
- D. ROOF/COVER
- E. PERIMETER DRAIN
- F. CATCH BASIN

NOTES

1. CONTAINMENT PAD AREA TO BE PORTLAND CEMENT CONCRETE.
2. CONTAINMENT PAD TO DRAIN TO OIL/WATER SEPERATOR. ADDITIONAL BASIC TREATMENT MAY BE REQUIRED.
3. GRADE SURROUNDING AREA AWAY FROM SERVICE AREA.
4. CANOPY TO EXTEND 3 FT. BEYOND PAD.
5. ROOF DRAIN TO STORM SYSTEM.
6. THESE FACILITIES REQUIRE EMERGENCY SPILL RESOPNSE AND CLEANUP PLAN TO BE ON-SITE.

ALTERNATIVE CONFIGURATION

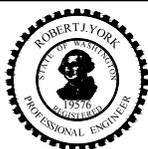
**VEHICLE SERVICE
DRAINAGE DETAIL**

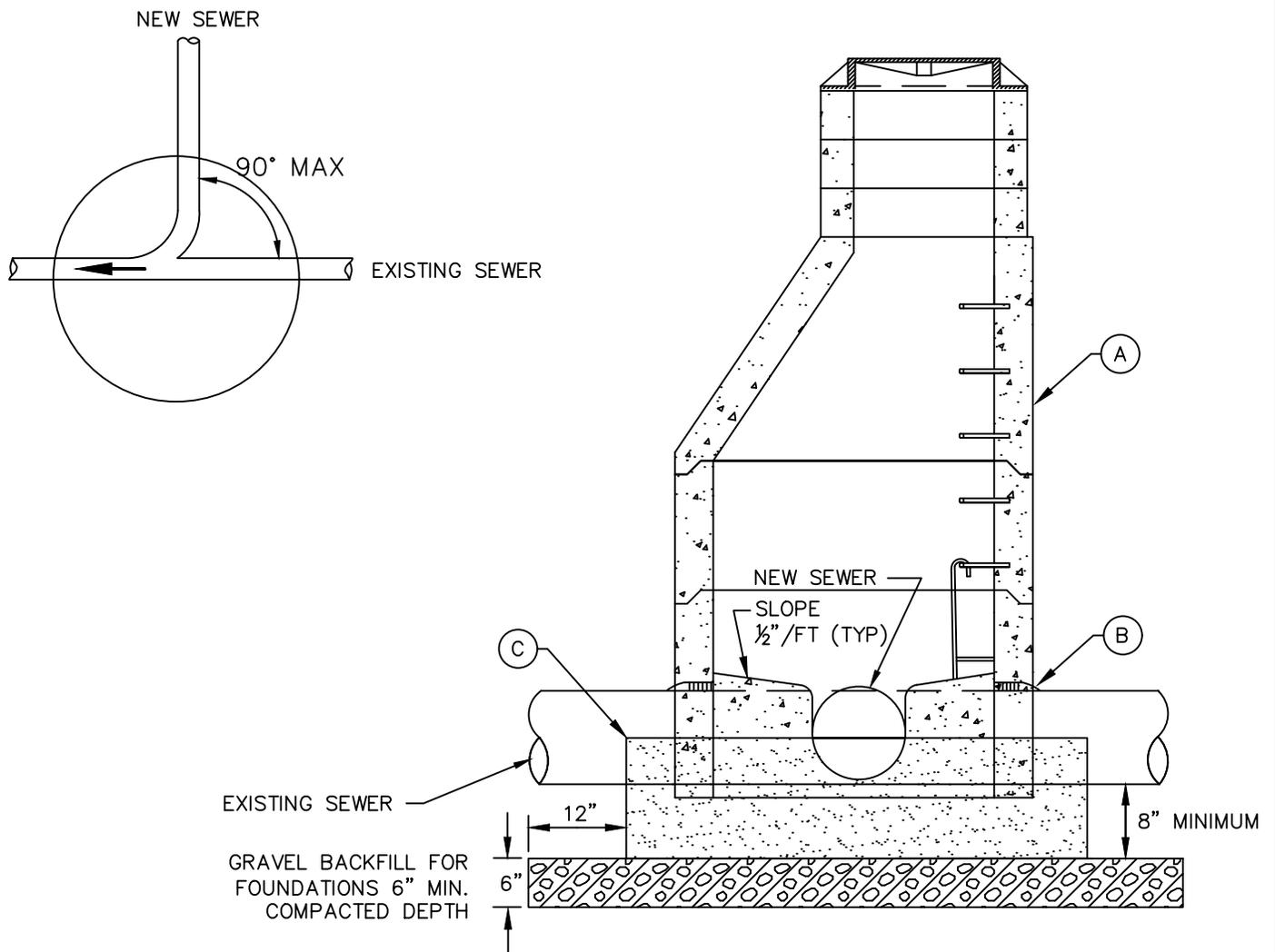
DATE: **2/01/2021**

SCALE: **NTS**

STANDARD
DETAIL NO.

S-13





LEGEND

- A. NEW MANHOLE PER STANDARD DETAIL S-01, S-02, OR S-03
- B. SAND COLLAR AND NON SHRINK GROUT
- C. CAST-IN PLACE CHANNEL AND SHELF. BASE TO BE DESIGNED BY LICENSED CIVIL ENGINEER.

NOTES

1. MANHOLE SHALL CONFORM TO THE GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS.
2. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT IN ANY POSITION.
3. CUT OUT EXISTING PIPE, MAKE SMOOTH INVERT AND CHANNEL AFTER NEW LINE IS ACCEPTED.
4. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.

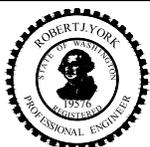
**NEW MANHOLE ON
EXISTING SEWER**

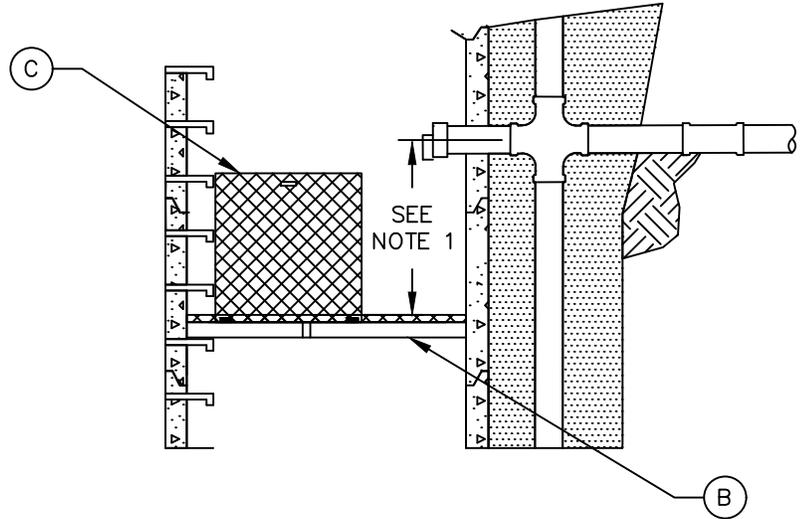
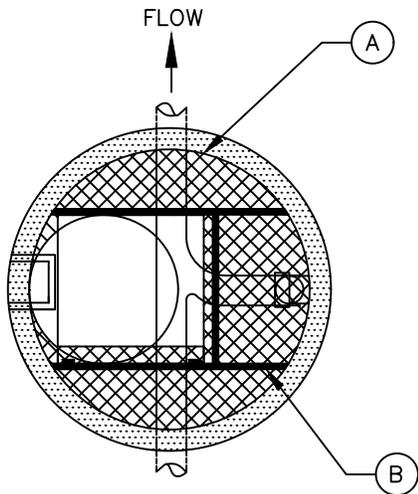
DATE: 2/01/2021

SCALE: NTS

STANDARD
DETAIL NO.

S-14



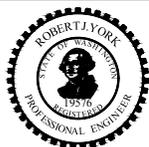


LEGEND

- A. 1-1/2" FIBER REINFORCED PLASTIC GRATING WITH 1-1/2" GRID NON SKID COATING
- B. FIBERGLASS REINFORCED PLASTIC STRUCTURAL SHAPE
- C. HINGED HATCH WITH HANDLE. HATCH DIMENSION: MINIMUM 30", MAXIMUM 48".

NOTES

1. PLATFORM TO BE INSTALLED IN STRUCTURES WITH DROPS AS FOLLOWS:
 - A. FOR DROP DEPTHS 8FT AND LESS, MAINTAIN 4FT CLEARANCE BETWEEN PLATFORM AND BENCH.
 - B. FOR DROP DEPTHS GREATER THAN 8FT, INSTALL PLATFORM 4FT BELOW DROP CLEANOUT. MOUNTING HARDWARE SHALL BE LOCATED A MINIMUM OF 4" FROM SECTION JOINT.
2. FIBERGLASS REINFORCED PLASTIC (FRP) GRATING AND STRUCTURAL SHAPES MANUFACTURER SHALL BE "FIBERGRATE COMPOSITE STRUCTURES INCORPORATED" OR APPROVED EQUAL.
3. FITTINGS AND FASTENERS SHALL BE STAINLESS STEEL.
4. ALL MACHINED OR CUT EDGES SHALL BE SEALED IN ACCORDANCE WITH THE FRP MANUFACTURER.
5. GRATING SHALL BE DESIGNED FOR A UNIFORM LOAD OF 100 PSF OR CONCENTRATED LOAD OF 300 LB. DEFLECTION OF FRP SHALL NOT EXCEED 0.375" OR $L/D = 120$, WHICHEVER IS LESS.



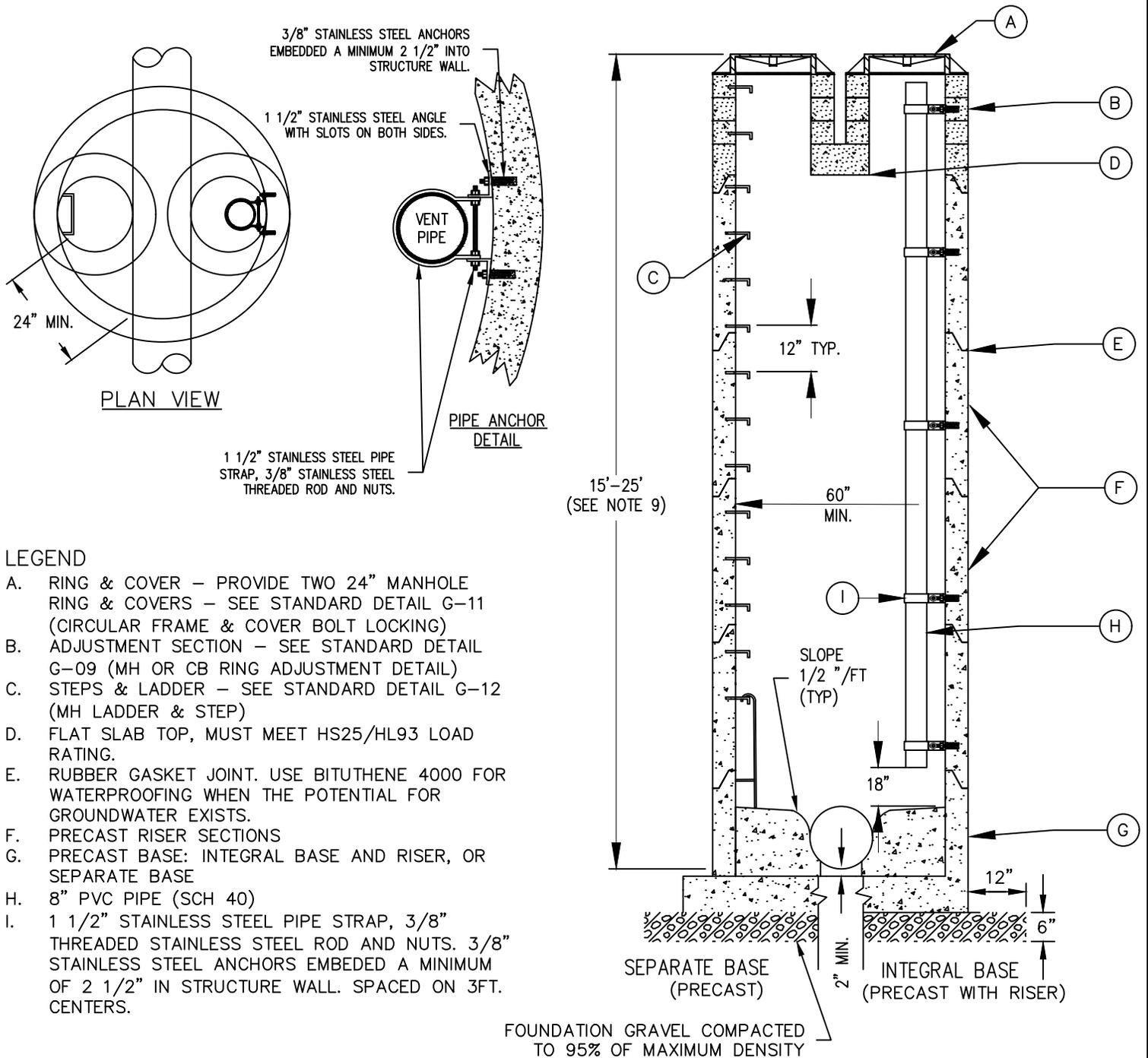
MANHOLE PLATFORM

DATE: 2/01/2021

SCALE: NTS

STANDARD
DETAIL NO.

S-15

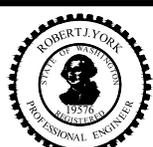


LEGEND

- A. RING & COVER – PROVIDE TWO 24" MANHOLE RING & COVERS – SEE STANDARD DETAIL G-11 (CIRCULAR FRAME & COVER BOLT LOCKING)
- B. ADJUSTMENT SECTION – SEE STANDARD DETAIL G-09 (MH OR CB RING ADJUSTMENT DETAIL)
- C. STEPS & LADDER – SEE STANDARD DETAIL G-12 (MH LADDER & STEP)
- D. FLAT SLAB TOP, MUST MEET HS25/HL93 LOAD RATING.
- E. RUBBER GASKET JOINT. USE BITUTHENE 4000 FOR WATERPROOFING WHEN THE POTENTIAL FOR GROUNDWATER EXISTS.
- F. PRECAST RISER SECTIONS
- G. PRECAST BASE: INTEGRAL BASE AND RISER, OR SEPARATE BASE
- H. 8" PVC PIPE (SCH 40)
- I. 1 1/2" STAINLESS STEEL PIPE STRAP, 3/8" THREADED STAINLESS STEEL ROD AND NUTS. 3/8" STAINLESS STEEL ANCHORS EMBEDDED A MINIMUM OF 2 1/2" IN STRUCTURE WALL. SPACED ON 3FT. CENTERS.

NOTES

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M198 AND M199, UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. PRECAST BASES SHALL BE FURNISHED WITH KOR-N-SEAL CONNECTOR, UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
3. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY SECTION POSITION.
4. SEE WSDOT STANDARD SPECIFICATIONS SEC. 7-05.3 AND 9-20.4(3).
5. ADJUSTMENT RISERS, FLAT SLAB TOP AND FRAME SHALL BE SET IN 3/4" NON-SHRINK GROUT. FILL LIFTING HOLES INSIDE AND OUT. PLASTER SMOOTH INSIDE AND OUT.
6. MINIMUM 2% SLOPE ON CHANNEL.
7. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER, AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.
8. FLAT SLAB TOP MUST MEET HS25/HL93 LOADING CRITERIA.
9. STRUCTURES GREATER THAN 25' DEEP REQUIRE SPECIAL DESIGN.



MANHOLE GREATER THAN 15 FEET DEEP

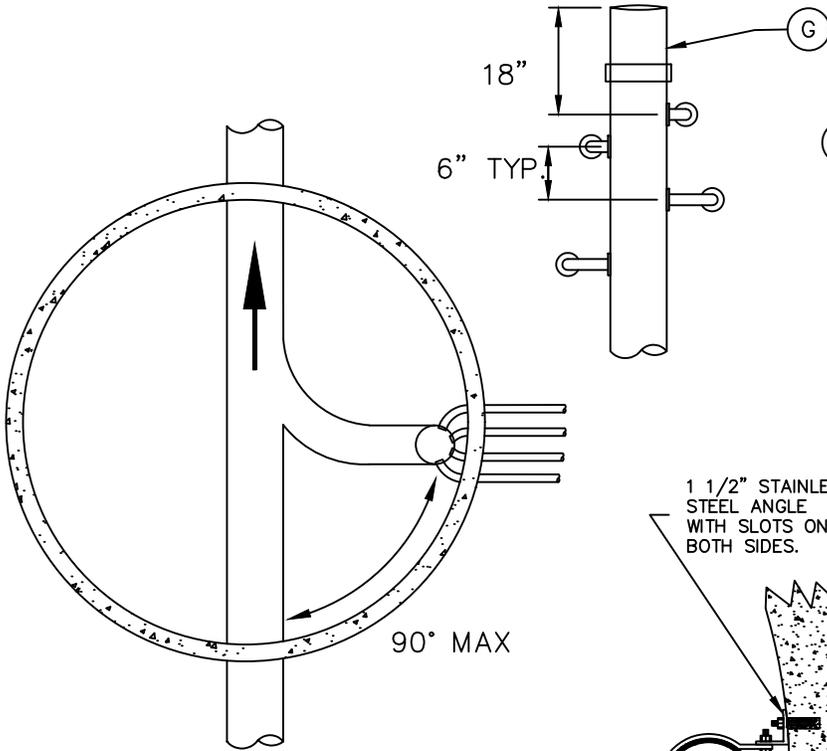
DATE: 2/01/2021

SCALE: NTS

STANDARD DETAIL NO.

S-16

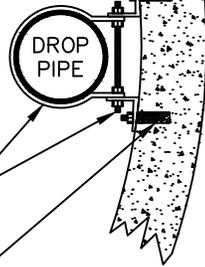
MANIFOLD DETAIL



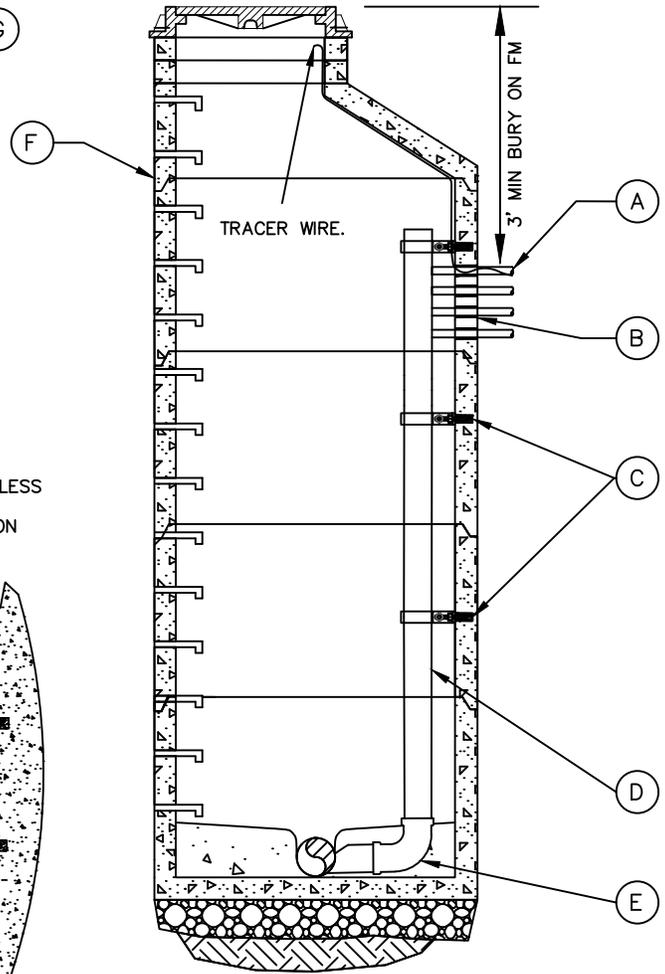
INDIVIDUAL FM CONNECTION DETAIL

1 1/2" STAINLESS STEEL PIPE STRAP, 3/8" STAINLESS STEEL THREADED ROD AND NUTS.
3/8" STAINLESS STEEL ANCHORS EMBEDDED A MINIMUM 2 1/2" INTO STRUCTURE WALL.

1 1/2" STAINLESS STEEL ANGLE WITH SLOTS ON BOTH SIDES.



PIPE ANCHOR DETAIL

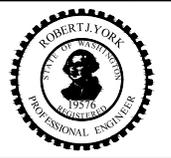


LEGEND

- A. 1 1/4" TO 2" FORCE MAIN WITH TRACER WIRE. TRACER WIRE SHALL BE TAGGED WITH THE ADDRESS BEING SERVED BY THE FORCE MAIN, AND ANCHORED TO THE STRUCTURE WITH ENOUGH LENGTH THAT IT MAY BE REACHED WITHOUT ENTERING THE MANHOLE.
- B. CORE DRILLED WITH KOR-N-SEAL CONNECTOR
- C. 1 1/2" STAINLESS STEEL PIPE STRAP, 3/8" THREADED STAINLESS STEEL ROD AND NUTS. 3/8" STAINLESS STEEL ANCHORS EMBEDDED A MINIMUM OF 2 1/2" IN STRUCTURE WALL. SPACED ON 3FT CENTERS.
- D. 8" ASTM 3034 SDR 35 PVC PIPE WITH RUBBER GASKETED JOINTS.
- E. 90° BEND, SDR 35 PVC RUBBER GASKETED JOINT. ENCASE IN CONCRETE.
- F. SEWER MH TYPE 1- SEE STANDARD DETAIL S-01 (SEWER MH TYPE I 48", 54", 60").
- G. 8" SDR 35 PVC MANIFOLD INSIDE DROP.

NOTES

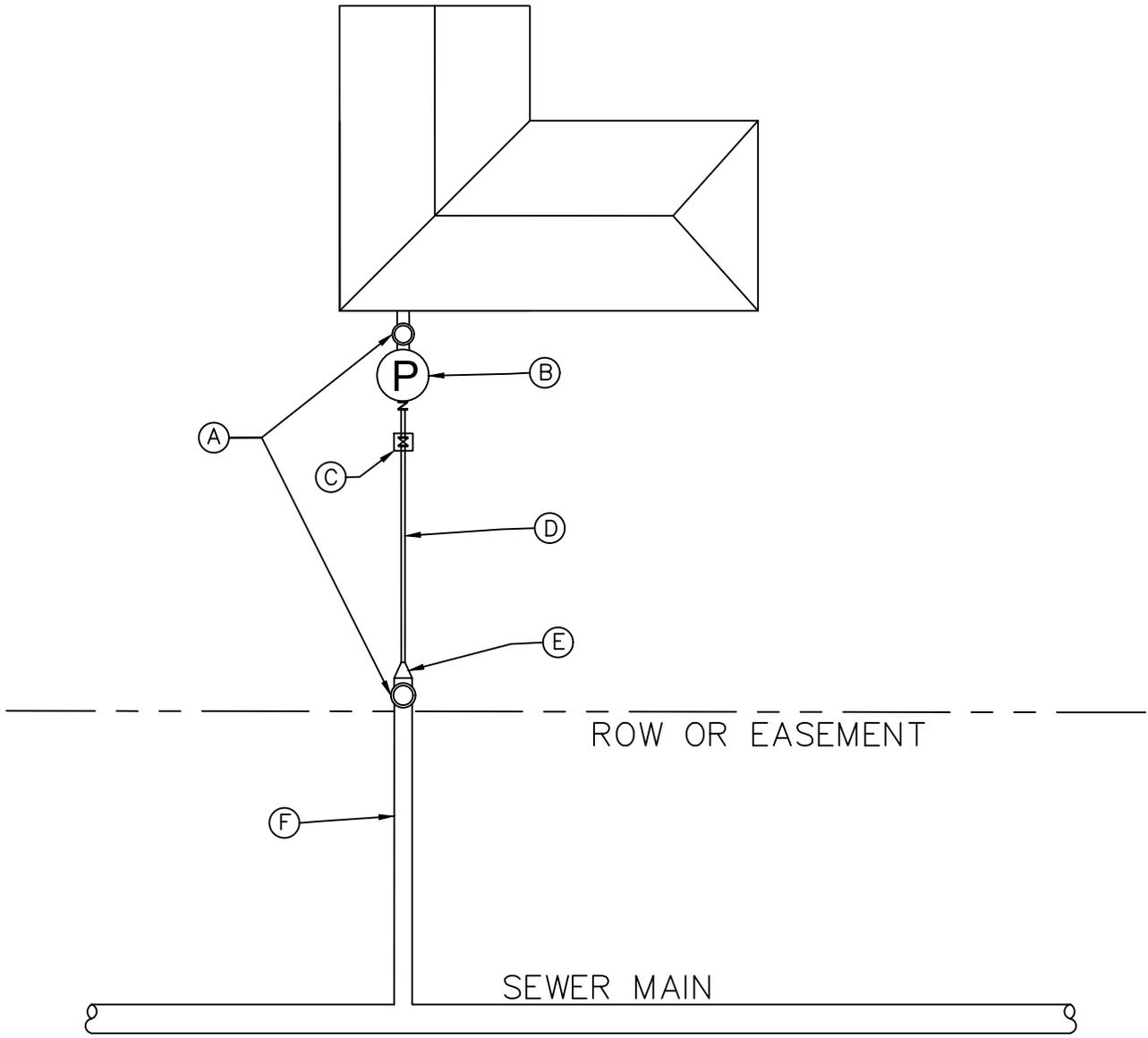
- 1. MANIFOLD INSIDE DROP SHALL BE INSTALLED ONLY WHERE APPROVED BY CITY.
- 2. MULTIPLE MANIFOLD INSIDE DROPS SHALL BE REVIEWED AND APPROVED BY THE CITY.
- 3. CORE DRILL OPENINGS FOR NEW PIPE.
- 4. CONSTRUCT CHANNEL WITH CLASS 3000 CONCRETE TO PIPE DIAMETER, AND SHELF TO THE CROWN OF PIPE. PROVIDE SMOOTH FINISH.



PRIVATE FORCE MAIN CONNECTION TO MANHOLE

DATE: 2/01/2021
SCALE: NTS

STANDARD DETAIL NO.
S-17



LEGEND

- A. CLEANOUT, SEE STANDARD DETAIL S-07.
- B. PUMP AND TANK ASSEMBLY WITH CHECK VALVE. SEE GRINDER PUMP DETAIL S-19.
- C. VALVE IN A METER BOX. COVER SHALL READ "SEWER". SEE APPROVED MATERIALS LIST.
- D. FORCE MAIN, SIZED ACCORDINGLY.
- E. 6" PVC SDR35 REDUCER SIZED TO FIT FORCE MAIN.
- F. 6" PVC SDR35 GRAVITY SIDE SEWER. SEE STANDARD DETAIL S-09.

NOTES

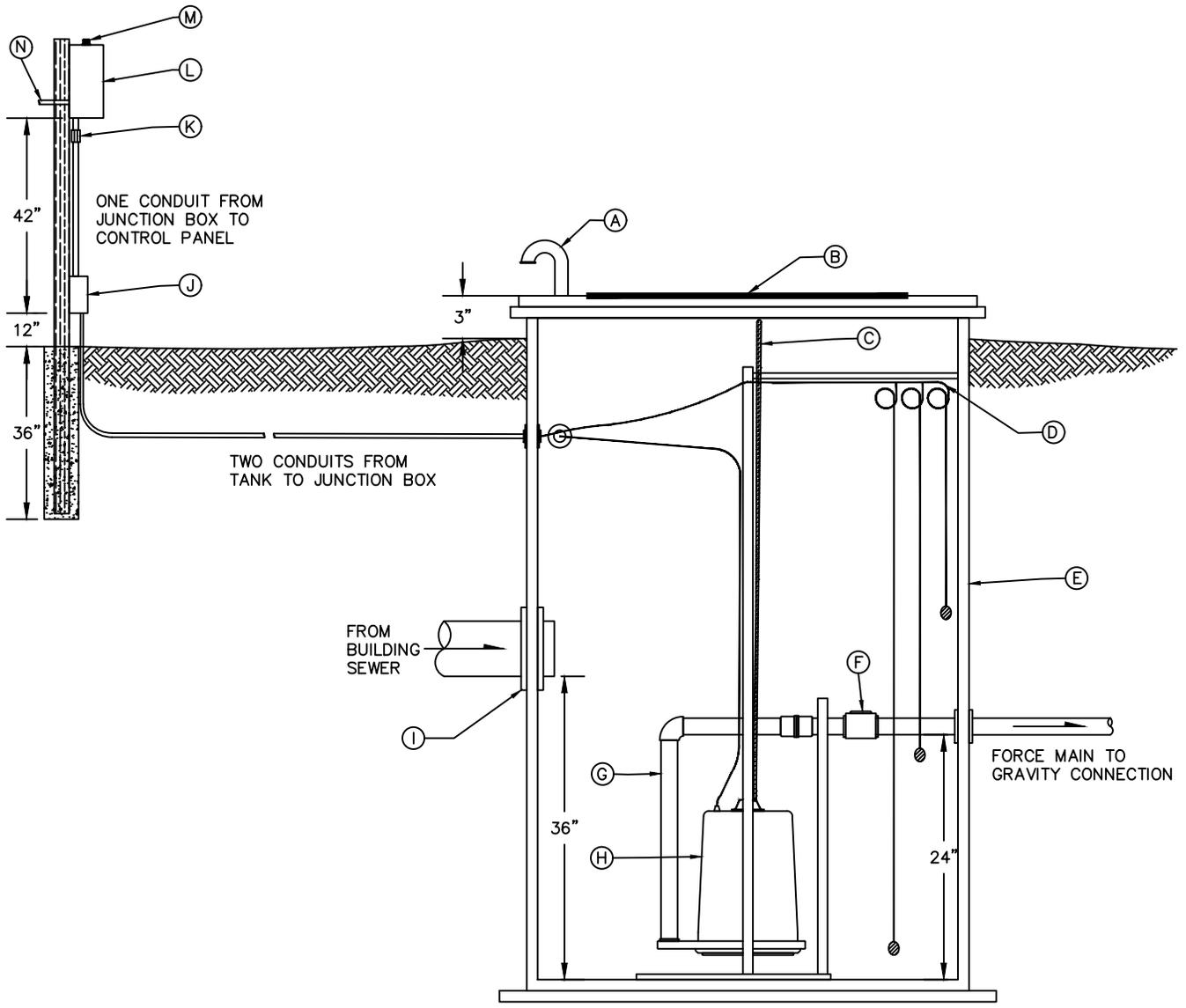
1. PUMP, VALVES, CLEANOUTS, SIDE SEWER AND FORCE MAIN ARE PRIVATE AND THE PROPERTY OWNERS RESPONSIBILITY TO MAINTAIN.
2. PUMP SHALL NOT BE CONNECTED TO A SEPTIC TANK OF ANY SIZE.
3. FORCE MAIN TESTING SHALL BE IN ACCORDANCE WITH SEWER STANDARDS.
4. A TRACER WIRE SHALL RUN ALONG THE FORCE MAIN FROM THE PUMP TO THE CLEANOUT AT THE PROPERTY LINE.



PRIVATE GRINDER PUMP SYSTEM

DATE: **2/01/2021**
SCALE: **NTS**

STANDARD
DETAIL NO.
S-18



LEGEND

- A. 1" VENT PIPE
- B. GALVANIZED STEEL COVER.
- C. PULL CABLE OR CHAIN.
- D. FASTEN 12"-18" SPARE WIRE FOR FLOAT ADJUSTMENTS WITH WIRE TIES.
- E. TANK
- F. CHECK VALVE.
- G. PIPING SIZED FOR PUMP.
- H. GRINDER PUMP. SEE NOTE 4.
- I. SEAL AT PIPE PENETRATION PER TANK MANUFACTURERS RECOMMENDATION.
- J. JUNCTION BOX
- K. EXPLOSIVE GAS SEAL OFF FITTING.
- L. PUMP CONTROL PANEL
- M. ALARM LIGHT
- N. POWER SUPPLY FROM HOUSE.

NOTES

1. TOP OF TANK SHALL BE APPROX. 3 INCHES ABOVE FINISHED GRADE. GROUND SHALL BE SLOPED AWAY FROM THE STATION.
2. THE OWNER SHALL MAINTAIN A 5 FOOT CLEAR AREA AROUND THE STATION.
3. VERIFY EXISTING SEWER OUTLET PRIOR TO INSTALLING GRINDER PUMP TANK.
4. GRINDER PUMP SHALL BE HYDROMATIC OR CITY APPROVED EQUAL.
5. SEE STANDARD DETAIL S-18 FOR FORCE MAIN TO GRAVITY CONNECTION.
6. CONTROL PANEL SHALL BE ATTACHED TO OWNERS HOUSE, OR WITH CITY APPROVAL ON A 4X4 PRESSURE TREATED POST SET IN 3 FT OF CONCRETE.
7. CONTROL PANEL WILL BE WITHIN 12 FT OF THE STATION.
8. SEALANT PRODUCT AT SEAMS SHALL BE CITY APPROVED.

**SINGLE FAMILY GRINDER
PUMP STATION**

DATE: 2/01/2021

SCALE: NTS

STANDARD
DETAIL NO.

S-19

